80-1134

No. ____

Supreme Court, U. S.
FILED
JAN 7 1981
MICHAEL RODAK, JR., CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1980

LEAD INDUSTRIES ASSOCIATION, INC., *et al.*,

Petitioners,

—against—

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, F. RAY MARSHALL, Secretary of Labor, and EULA BINGHAM, Assistant Secretary of Labor for Occupational Safety and Health,

Respondents.

Petition for a Writ of Certiorari to the United States Court of Appeals for the District of Columbia

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Questions Presented

1. What is the scope of OSHA's statutory authority to promulgate health and safety regulations?

A. *Technological Feasibility.* Does OSHA have authority to issue a standard without evidence or a finding that the technology necessary for compliance exists or can be developed in the near future (if ever), and to compel entire industries to abandon their basic production technologies and to rebuild their plants and factories, from the ground up?

B. *Economic Feasibility.* Does OSHA have authority to adopt a health standard when, by its own admission, the agency has not computed, estimated or analyzed the cost of complying with the standard and has not considered the cumulative cost impact of the standard and other occupational and environmental regulations?

C. "*Reasonably Necessary*". Does OSHA have authority to adopt as "reasonably necessary" a health standard when the agency has not estimated and cannot estimate whether the new standard will provide greater health benefits than the old one; has designed the standard not to protect workers from "concrete medical disability" but to prevent subclinical "effects" which occur in the "absence of illness"; and has not conducted any cost-benefit or cost-effectiveness analyses?

D. *Earnings Protection.* Does OSHA have authority to supersede workmen's compensation laws by imposing a requirement for "medical removal protection" that mandates the payment of full wages and benefits to all employees removed from lead exposure, including employees who are not ill and for whom alternate work positions are not available?

2. If the Occupational Safety and Health Act is interpreted to give OSHA authority to promulgate a standard in any of the

circumstances described in Question 1(A) or 1(B), does the Act unconstitutionally delegate legislative authority to the agency?

3. Did OSHA deny the industry petitioners due process of law: (a) by adopting a health standard which was materially different from and far more stringent than the proposed standard and which, because it was issued without adequate rulemaking notice, deprived petitioners of the opportunity to provide the agency with data needed for a decision based upon "substantial evidence", and (b) by relying upon secret, post-hearing studies by independent, outside experts?

List of Parties

The names of the petitioners and intervenors who sought review of the revised permanent standard for occupational exposure to lead issued by the Occupational Safety and Health Administration on November 13, 1978, 43 Fed. Reg. 53007-14 (November 14, 1978), are set forth in footnote 1 below.[1] The

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1 United Steelworkers of America, AFL-CIO-CLC; International Union, United Automobile, Aerospace & Agricultural Implement Workers of America; National Constructors Association; Oil, Chemical and Atomic Workers International Union; and Cast Metals Federation (No. 79-1048); American Iron & Steel Institute, Inc.; Bethlehem Steel Corp.; Jones & Laughlin Steel Corp.; National Steel Corp.; Republic Steel Corp.; United States Steel Corp.; and The Shipbuilders Council of America (No. 79-1054); Lead Industries Association, Inc.; Chloride, Incorporated; Standard Industries; Dixie Metals Co.; Schuylkill Metals Corp.; and Bunker Hill Co. (No. 79-1078); Battery Council International, Inc. (No. 79-1079); ASARCO Incorporated (No. 79-1080); Southwire Co. (No. 79-1081); National Paint & Coatings Association, Inc. and Sigma Coatings, Inc. (No. 79-1082); PPG Industries, Inc. (No. 79-1083); South Central Bell Telephone Co., Inc.; Southern Bell Telephone and Telegraph Co.; Southwestern Bell Telephone Co.; American Telephone and Telegraph Co.; Bell Telephone Co. of Nevada; The Bell Telephone Co. of Pennsylvania; The Chesapeake and Potomac Telephone Co.; The Chesapeake and Potomac Telephone Co. of Maryland; The Chesapeake and Potomac Telephone Co. of Virginia; The Chesapeake and Potomac Telephone Co. of West Virginia; Cincinnati Bell Incorporated; The Diamond State Telephone Co.; Empire State Subway Co. (Limited); Illinois Bell Telephone Co.; Indiana Bell Telephone, Inc.; Michigan Bell Telephone Co.; The

respondents are F. Ray Marshall (Secretary of Labor), Eula Bingham (Assistant Secretary of Labor for Occupational Safety and Health) and the Occupational Safety & Health Administration.

Mountain States Telephone and Telegraph Co.; Malheur Home Telephone Co.; The Ohio Bell Telephone Co.; New England Telephone and Telegraph Co.; New Jersey Bell Telephone Co.; New York Telephone Co.; Northwestern Bell Telephone Co.; Pacific Northwest Bell Telephone Co.; The Pacific Telephone Co.; The Southern New England Telephone Co.; Wisconsin Telephone Co.; Bell Telephone Laboratories, Inc.; Transoceanic Communications, Inc.; Transoceanic Cable Ship Company, Inc.; and Transpacific Communications, Inc. (No. 79-1084); General Motors Corp. (No. 79-1106); Ford Motor Co. (No. 79-1107); Chrysler Corp. (No. 79-1108); National Association of Recycling Industries, Inc.; Inland Metals Refining Co.; Keystone Resources Corp.; and RSR Corp. (No. 79-1111); Ethyl Corp. (Nos. 79-1114 and -1145); Corning Glass Works (No. 79-1120); St. Joe Minerals Corp. (No. 79-1121); and RSR Corp. (No. 79-1146).

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OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, F. RAY MARSHALL, Secretary of Labor, and EULA BINGHAM, Assistant Secretary of Labor for Occupational Safety and Health,

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Opinions Below

The opinions of the Court of Appeals are unofficially reported at 8 O.S.H.C. 1810 (August 28, 1980) and appear in the Appendix to this petition (pages 1a to 286a, *infra*).[2] The standard for occupational exposure to lead (the "Standard"), which was issued by OSHA on November 13, 1978, is found at

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2 The majority decision was written by Chief Judge Wright, with Judge Robinson concurring, and is cited to the Appendix in this petition as "Maj. Op. at ____"; the dissent was written by Judge MacKinnon and is cited "Diss. Op. at ____". All emphasis has been added throughout this petition unless otherwise indicated.

43 Fed. Reg. 53007-14 (Nov. 14, 1978), as corrected in 44 Fed. Reg. 5446-48 (Jan. 26, 1979) and 44 Fed. Reg. 20680-81 (Apr. 6, 1979); OSHA's preamble and explanatory text appear in volume 43 of the Federal Register at pages 52952-53007 (Nov. 14, 1978) and pages 54354-509 (Nov. 21, 1978), and are cited in this petition by Federal Register page and column (*e.g.* 52952/1).

Jurisdiction

The judgment of the Court of Appeals was entered on August 15, 1980. Timely petitions for rehearing were filed by the National Association of Recycling Industries, Inc. ("NARI"), on August 29, 1980, and, as permitted by the lower court, by the Lead Industries Association, Inc. ("LIA"), and others on September 25, 1980. On October 16, 1980, industry petitioners moved for a stay of the Standard until 30 days after the final determination of the rehearing petitions, advising the Court of Appeals that "the industry petitioners in this action intend to seek review by the Supreme Court in the event that their Rehearing Petition is denied." By orders dated October 24, 1980, the lower court denied the pending motions, including industries' petitions for rehearing and their stay application, and directed that the mandate become effective forthwith. Subsequent applications to this Court by NARI, the American Iron and Steel Institute, LIA and others for a stay of the Standard were granted on December 8, 1980 with respect to provisions relating to engineering and work practice controls, compliance plans, new hygiene facilities, ZPP tests, multiple physician review procedures, signs and certain start-up dates.

This Court's jurisdiction is invoked under 28 U.S.C. § 1254(1).

Statute Involved

The statutory provisions involved in this case are Sections 3(8), 4(b)(4), 6(b)(5), 6(b)(7) and 6(f) of the Occupational

Safety and Health Act (the "Act" or the "OSHA Act"), 29 U.S.C. §§ 652(8), 653(b)(4), 655(b)(5), 655(b)(7) and 655(f). The relevant text of these provisions is set forth at pages 287a through 290a of the Appendix hereto. Procedural regulations issued by OSHA are found in 29 C.F.R. Part 1911.

Statement of the Case

For centuries lead has been a "crucial" element in "the manufacture of a vast number of essential products." Maj. Op. at 8a. Industries as diverse as battery manufacturers, steel companies, automobile manufacturers, telecommunication firms, electronics companies, pigment manufacturers, the entire defense industry, and others consume annually more than one million tons of lead, most of which is produced by the nation's primary and secondary lead smelting industries.

OSHA has regulated workplace air-lead levels since 1971, when it adopted the national consensus standard of 200 ug/m³ (micrograms of lead per cubic meter of air) as the permissible exposure limit ("PEL"). 29 C.F.R. § 1910.1000, Table Z-2. At that time, it was generally accepted that worker blood-lead concentrations should be maintained below 80 ug/100g (micrograms per 100 grams of whole blood) (52952/3; Exhibit 294B, at 179), and even now OSHA acknowledges that lead-associated illness seldom occurs except at higher blood-lead concentrations (54471/1). Unlike most of the other substances for which OSHA has issued new health standards, lead is not a carcinogen.

On October 3, 1975, OSHA published a proposed regulation that would have reduced the permissible exposure limit by half, from 200 ug/m³ to 100 ug/m³. The proposal also contained detailed requirements concerning environmental monitoring, medical surveillance, respirator use, employee training, housekeeping and record maintenance.

OSHA conducted hearings in March, April and May 1977 concerning the proposed exposure limit of 100 ug/m³. The

agency reopened the record in September 1977 for the limited purpose of receiving comments concerning a supplemental proposal for "medical removal protection" ("MRP"). Under the supplemental proposal, an employer would be required to remove workers from lead-exposed jobs in certain circumstances, in the absence of any risk of death or serious injury, and would also be required to pay them their usual wages and maintain their seniority as if they were still working. Hearings were held on medical removal protection during November and December 1977.

Among the several independent, expert witnesses who had presented evidence at OSHA's request during the hearing concerning the feasibility of the 100 ug/m³ exposure limit and MRP were David J. Burton and Nicholas Ashford.[3] After the hearings had been concluded, OSHA—without notifying the parties—retained both experts to prepare *ex parte* post-hearing reports which responded to criticism of their earlier testimony and which for the first time provided data and expert commentary to the agency on a *new* issue—the feasibility of a PEL of 50 ug/m³.[4]

On November 13, 1978, OSHA adopted a regulation establishing an exposure level of 50 ug/m³ and imposing a full MRP requirement. Because the subject of the evidence submitted in the record had been the proposed air-lead exposure limit of 100 ug/m³ (*see* Maj. Op. at 169a), and there is thus virtually no

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3 Both Burton (of D.B. Associates, Inc.) and Ashford (of MIT's Center for Policy Alternatives) were retained by OSHA because, as the agency admitted, "OSHA . . . does not have the in-house capability" or the "in-house expertise" to conduct the necessary reviews and analyses. Wrenn Aff. ¶ 10; *see* Maj. Op. at 36a. Burton alone was paid more than $243,000 for his work (ALD 20).

4 See Maj. Op. at 38a-39a; Diss. Op. at 247a-48a. As the majority acknowledges (Maj. Op. at 45a, 42a), "the post-hearing contract with [Burton] was OSHA's first attempt to obtain expert advice directly addressing the feasibility of the 50 ug/m³ standard." Although Burton and Ashford had been cross-examined during the hearing (as required by OSHA's own rules, 29 C.F.R. § 1911.15(b)(2)), their post-hearing studies were not included in the record; nor were they made available to the public for review and comment.

evidence in the record on the subject, OSHA was unable to point to any technology that would enable the major lead industries to meet the 50 ug/m³ PEL. Indeed, OSHA recognized that even to attempt compliance with the new exposure level would compel the major lead industries to rebuild their plants and factories, from the ground up, to accommodate completely new and "highly speculative" technology (*e.g.*, 52978-79, 52981-82, 52979/3; Maj. Op. at 145a),[5] and the agency therefore gave those industries five to ten years within which to attempt compliance with the final PEL of 50 ug/m³ (53008/1). Because of the speculative nature of the hoped-for technology, and because the only studies in the record related to the cost of the *proposed* PEL of 100 ug/m³, OSHA, by its own admission, did not and could not estimate the cost of attempting to comply with the final PEL of 50 ug/m³ (54496/3, 52981/3).

The medical removal protection provision in the Standard requires that workers whose blood-lead levels exceed a specified level (currently 70 ug/100g, to be phased down to 50 ug/100g by 1983) must be removed from exposure and may not be returned until their blood-lead levels have been reduced.[6] Re-

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5 For example, OSHA stated that the primary lead smelting industry "may need to rebuild in part or in whole" over a ten-year period "to achieve a healthful workplace . . . . Attainment of the PEL may require the development and implementation of substantial technological change, possibly including alternatives to pyrometallurgy which are now in the experimental stage" (52978-79, 52981-82, 54480). OSHA further acknowledged that each secondary smelter will "require construction of an entirely new smelting plant" (52979/3, -/2); the battery industry will require "significant modifications . . . in the production process" (52984/1); nonferrous foundries will "require some further [but undefined] development and refinement" in their technology (52985/1); and pigment manufacturers will either "require extensive modification of the[ir] present production processes" and plants or will have to give up lead altogether and use "other [unidentified] materials" (*ibid.*).

6 It is important to keep in mind that the present removal level of 70 ug/100g is not indicative of sickness or physical disability. As OSHA acknowledges, even workers with blood-lead levels in excess of the initial MRP removal "trigger" of 80 ug/100g—the generally accepted biological guideline at the time these proceedings commenced—will

moval can also be effected on the basis of a doctor's determination. In order to encourage workers to participate in the biological monitoring and medical surveillance programs (54441/2), employers must maintain the earnings (including overtime) and seniority of workers removed from lead-exposed jobs as if the workers had not been removed. Employers must provide such earnings protection even when the worker is not ill or disabled (54471/1), even when the worker's elevated blood-lead level is not the employer's fault and is not occupationally related (54472/3, 54473/1), and even when the employer has no position available to which the removed worker can be productively transferred (54467/3). The MRP requirement, the cost of which OSHA never computed, is thus markedly beyond the provision in the cotton dust standard now before the Court in *American Textile Mfrs. Institute, Inc. v. Marshall*, Docket Nos. 79-1429, -1583 (the "Cotton Dust Case").[7]

The Standard as issued was scheduled to become effective on February 1, 1979. The effective date was administratively stayed on January 25, 1979 by OSHA, 44 Fed. Reg. 5446 (January 26, 1979), and was partially stayed by the Court of Appeals on March 1, 1979 pending judicial review pursuant to 29 U.S.C. § 655(f). By a split decision, the Court of Appeals affirmed the Standard on August 15, 1980 as to the major lead industries, and remanded to OSHA for further consideration

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seldom have any "concrete medical disability or impairment involving symptoms of disease" (54471/1). Indeed, OSHA and the lower court have acknowledged that the new Standard was designed not to protect workers from actual disease or illness but to prevent subclinical biological "effects" which occur *in the "absence of illness"* (52964/1, 54413/2; *see* Maj. Op. at 115a-16a, 128a).

7 The limited medical removal protection provision at issue in the Cotton Dust Case is not related to an employer's medical program and applies only to employees who are unable to wear respirators and for whom "another position . . . is available". *See* 29 C.F.R. § 1910.1043 (f)(2)(v). Thus, as the majority panel in the case at bar recognized, the MRP provision in the lead Standard is very different from the one in the Cotton Dust Case and is "relatively without precedent". *See* Maj. Op. at 12a, 22a n.15, and 66a n.63.

with respect to certain other industries (the "remand industries"). Although the lower court correctly concluded that OSHA had failed to establish that the Standard was feasible for the remand industries, it nevertheless ordered those industries to comply with virtually all of the Standard during the remand.

Reasons for Granting the Writ

THE DECISION BY THE COURT BELOW IS INCONSISTENT WITH THIS COURT'S DECISIONS IN THE *BENZENE* AND *WHIRLPOOL* CASES AND WITH NUMEROUS DECISIONS BY OTHER COURTS OF APPEALS, AND RAISES IMPORTANT ISSUES CONCERNING THE SCOPE OF OSHA'S STATUTORY AUTHORITY TO AFFECT THE SURVIVAL OF ENTIRE INDUSTRIES.

The clarification of OSHA's standard-setting powers which began with *Industrial Union Dep't v. American Petroleum Institute*, 448 U.S. ____, 100 S.Ct. 2844 (1980) (the "Benzene Case"), and is continuing with the Cotton Dust Case, is of critical importance. Because OSHA's standards have a profound impact on the national economy and often jeopardize the very survival of entire industries, it is imperative that the limitations on the agency's authority be defined with precision and enforced with consistency. Unless this petition is granted, however, conflicting circuit court decisions will continue to create confusion and uncertainty concerning important issues that were not presented by the Benzene Case and will not be resolved by the Cotton Dust Case.[8]

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8 The problems created by the new lead Standard result largely from OSHA's continued insistence upon attempting to eliminate all risk to worker health, however insubstantial and unproven the risk and however infeasible the required technology. Indeed, as OSHA director Eula Bingham has bluntly asserted, the agency believes that it is not "prohibited from doing just about anything we want to do." Address by Assistant Secretary Bingham to ABA Institute on Law, Science and

In contrast to the Cotton Dust Case, where the technological feasibility of OSHA's standard is not at issue, the present case raises the question whether OSHA may adopt a standard which compels major industries to rebuild their plants and completely change their production processes in order to pursue OSHA's extreme policies.[9] This case also raises the companion question whether, if OSHA has such authority, it may satisfy the feasibility requirement, without the benefit of any formal, technical study of the exposure limit ultimately adopted and without finding that there is technology available capable of achieving that exposure level. OSHA has here merely created an *ipse dixit* "presumption" that in five to ten years all affected industries will be able to develop technologies capable of meeting the Standard in *some* of their operations. The decision of the court below upholding OSHA on these issues is not only in conflict with this Court's ruling in the Benzene Case and with decisions of the Courts of Appeals for the Second, Third and Fifth Circuits, but also so frees the agency from any of the statutory limitations on its standard-setting powers as to create an unconstitutional delegation of legislative power.

This case also significantly extends the latitude improperly afforded OSHA by the Court of Appeals in the Cotton Dust Case in connection with the issue of economic feasibility. In the Cotton Dust Case, OSHA at least purported (however inaccu-

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Technology in Health Risk Regulation (April 20, 1979), reported at 1979 BNA OSHA Rptr. 1690 (April 26, 1979).

9 Were the lower court's interpretation of OSHA's authority over production processes to be upheld, OSHA for all practical purposes would have the power to dictate what goods and materials could be produced in this country and what industries would be permitted to survive. Indeed, in the case at bar, OSHA's own expert consultants concluded that enforcement of even the *proposed* PEL of 100 ug/m³ would jeopardize the continued existence of two of the nation's four primary lead smelters, eliminate 17-19 of approximately 50 secondary smelters, and force more than 100 battery companies (out of 143 firms) out of business. *See* Ex. 26, at 1-2; Ex. 234[24], at 2; 52984/2; Maj. Op. at 193a, 204a.

rately) to make findings concerning the cost impact of the new regulation. In the present case, by comparison, OSHA conceded that it had not estimated the cost of meeting the final exposure level of 50 ug/m³, largely because of the "highly speculative" nature of the technology that would have to be developed even to *attempt* compliance. Here again, the decision by the court below—allowing OSHA to promulgate the Standard without determining or analyzing the cost of meeting the 50 ug/m³ PEL and without computing the cost of the MRP requirement—conflicts with decisions by other courts of appeals. Moreover, the decision by the lower court, permitting OSHA to impose upon employers an obligation to continue paying full salary to workers who are removed from lead exposure under the Standard's inflexible requirements, is contrary to this Court's decision in *Whirlpool v. Marshall*, 445 U.S. 1 (1980), and directly contravenes Section 4(b)(4) of the Act, 29 U.S.C. § 653(b)(4).

Quite apart from the question of feasibility, the decision by the lower court is contrary to this Court's decision in the Benzene Case, and to decisions by other courts of appeals, insofar as it holds that the Standard was "reasonably necessary". Here, for example, (a) OSHA conceded that it could not meaningfully estimate the health benefits, if any, that would result from the reduced air-lead exposure limit (54427/1), (b) the lower court acknowledged that there was no evidence concerning "the actual incidence of significant health effects at the old and new" exposure limits (Maj. Op. at 110a), and (c) the lead Standard was designed, not to prevent significant risks to health, but merely to protect workers from biological "effects" which, as OSHA recognized, occur in the "absence of illness" (52964/1, 54413/2; Maj. Op. at 115-16, 128). Nor did OSHA conduct either a cost-benefit or a cost-effectiveness analysis.

In addition to these important questions about the OSHA Act, this case presents pervasive procedural issues concerning the obligation of OSHA and other administrative agencies to give interested persons adequate notice of, and an opportunity

to comment on, proposed regulations and the evidence submitted in support of those regulations.

As noted earlier, OSHA issued a rulemaking notice and held extensive hearings concerning a proposed air-lead PEL of 100 ug/m^3 but then, after obtaining secret, post-hearing evidence from independent experts, adopted a materially different and far more stringent 50 ug/m^3 exposure limit. In doing so, OSHA turned applicable procedural requirements concerning cross-examination and rulemaking notice into a charade, denied interested persons due process, and made it impossible for the agency to obtain the data necessary to meet the "substantial evidence" and "best available evidence" requirements. The lower court's decision sanctioning OSHA's actions misinterprets *Vermont Yankee Nuclear Corp. v. NRDC*, 435 U.S. 519 (1978), and totally frustrates meaningful review of administrative regulations.

A. The panel majority misinterpreted the technological feasibility requirement, incorrectly defined and applied the substantial evidence test, and construed the Act to permit an unconstitutional delegation of legislative authority.

This Court has never considered whether Congress gave OSHA power to adopt a standard when the technology capable of achieving that standard does not exist and will not be available soon (if ever) to the industries affected. Nor has the Court had occasion to consider whether OSHA has the authority to adopt a standard that forces an industry to abandon or rebuild its existing plants in order to develop and implement entirely new production processes which may never be effective. It is essential that the Court consider these issues to ensure that the feasibility requirement remains a viable part of the Act, as intended by Congress.

If permitted to stand, the majority decision would relieve OSHA of any obligation to determine that technology capable of meeting a standard is or soon will be available. The view of the panel majority is that, "[s]ince . . . the agency will [be

allowed to] make *highly speculative* projections about future technology, . . . [the courts] cannot require OSHA to prove with *any* certainty that industry will be able to *develop* the necessary technology, or even to *identify* the single technological means by which it expects industry to meet the PEL." Maj. Op. at 145a. Instead, all that is required, the majority concludes, is for someone to "conceive" some "industrial strategies" or "embryonic schemes for compliance" involving "highly speculative" technology that industry must somehow implement over a five- or ten-year period (*e.g.*, Maj. Op. at 145a, 172a).

The majority's interpretation of the Act not only eliminates the requirement that standards must be technologically feasible but also enables OSHA to avoid any meaningful review under the "substantial evidence" test in Section 6(b)(5), 29 U.S.C. § 655(b)(5). Indeed, the lower court upheld the Standard despite OSHA's admission that "virtually all of . . . [the] evidence" presented at the hearings "went to the feasibility of . . . [the proposed exposure limit of] 100 ug/m^3," *not* the final PEL of 50 ug/m^3. OSHA Ct. App. Stay Br. at 6; *see* Diss. Op. at 248a, 255a.

A court, the majority posits, need only "find substantial evidence to justify [the] *presumption*" that there is a "reasonable *possibility*" that at some point in the future a "typical firm" will be technologically able to comply with the Standard in "*most*" of its operations. Maj. Op. at 154a, 159a.[10] On the

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10 The majority attempted to justify this reduction of OSHA's burden of proof by noting the availability of temporary variance proceedings and enforcement proceedings in which a company could contend that subsequent events have proven the Standard infeasible. Maj. Op. at 161a-63a. The lower court's approach simply ignores the structure of the Act, which requires OSHA to establish the feasibility of a standard *before* imposing upon individual companies the burden of proving that the standard cannot be met. Common sense dictates the same result, since obviously it would be absurd to compel industries to waste enormous sums vainly attempting to comply with a standard for which the necessary technology admittedly does not exist and cannot soon, if ever, be developed. Indeed, in the analogous context of a challenge to

basis of this legally untenable premise, the majority found—not surprisingly—that the substantial evidence test had been satisfied by evidence which "give[s] *some credence* to OSHA's *prediction* that the PEL *might* be met." Maj. Op. at 177a. Indeed, with respect to the primary and secondary smelting industries generally, the majority upheld the Standard even though OSHA only "managed to cite *some* record evidence promising technological developments that *might* meet the PEL in the long range." *Id.* at 206a.

These interpretations by the lower court of the technological feasibility requirement and of a court's role in reviewing agency findings of feasibility are unjustifiable for at least three reasons.

First, they conflict with prior decisions of other circuit courts of appeals interpreting the technological feasibility requirement. Those decisions have permitted OSHA to "force" an industry to upgrade its technology only when OSHA has found, on the basis of substantial evidence, either (i) that technology exists (not *might* exist) which is readily adaptable to the industry in question, or (ii) that the necessary technological improvements "loom on *today's* horizon" and involve changing *existing* "processes" or "devices", *not* rebuilding all plants or developing completely new and untested technologies for entire industries a decade hence. *See, e.g., Society of Plastics Industry, Inc. v. OSHA*, 509 F.2d 1301, 1309-10 (2d Cir.), *cert. denied*, 421 U.S. 992 (1975); *American Iron & Steel Institute v.*

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an EPA air pollution standard, the Court of Appeals properly rejected such a shift of the burden of proof and held that "the flexibility appropriate to enforcement will not render 'achievable' a standard which cannot be achieved on a regular basis . . . ." *National Lime Ass'n v. EPA*, 627 F.2d 416, 431 n.46 (D.C. Cir. 1980).

Equally without merit is the majority's conclusion that an OSHA health standard can be technologically feasible if it is feasible "in *most* . . . operations." Maj. Op. at 159a. Such an interpretation of OSHA's rulemaking authority would permit the agency to disregard totally the requirements of the Act with respect to precisely those hard-to-control operations that may create the health hazards which are the subject of the Act.

OSHA, 577 F.2d 825, 833-34 (3d Cir. 1978), *cert. granted*, 100 S.Ct. 3054, *cert. dismissed*, 101 S.Ct. 38 (1980); *Marshall v. West Point Pepperell, Inc.*, 588 F.2d 979 (5th Cir. 1979).

Second, the interpretations are contrary to this Court's statement in the Benzene Case, 100 S.Ct. at 2869, that the agency must meet the burden of producing sufficient evidence to show that "it is at least more likely than not" that the statutory standard was satisfied. *See also Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971); *National Lime Ass'n v. EPA*, 627 F.2d 416, 430, 451 n.126 (D.C. Cir. 1980); *Texas Independent Ginners Ass'n v. Marshall*, 630 F.2d 398, 409 (5th Cir. 1980). The majority's reliance upon hopeful "presumptions" does not satisfy these requirements. *Compare* Maj. Op. at 145a.

Finally, the majority's interpretations have the effect of expanding OSHA's authority beyond the constraints carefully imposed by Congress in its choice of statutory language, raising the spectre of an unconstitutional exercise of discretion without the safeguard of appropriate review. The Act limits OSHA's power to the realm of technological feasibility; the lower court's decision expands that power to the world of speculation where "presumption" replaces evidentiary fact. *See* the Benzene Case, 100 S.Ct. at 2866.

B. The panel majority misinterpreted the economic feasibility requirement by permitting the agency to issue a health standard without computing or analyzing the cost of the regulation.

As is true with respect to technological feasibility, this case presents important issues concerning OSHA's obligation to estimate the economic impact of a standard, issues that have not previously been considered by the Court and are not raised in the Cotton Dust Case. Thus, the majority of the Court of Appeals panel found that OSHA had demonstrated economic feasibility despite the *conceded* absence of any evidence what-

soever with respect to the economic feasibility of the 50 ug/m^3 exposure limit. *It is undisputed that the agency never computed or even estimated the cost of complying with the final PEL.*[11] Maj. Op. at 169a-70a; Diss. Op. at 255a, 271a. Nor did OSHA estimate the cumulative impact from the combined costs of the Standard and other government regulations, at least one of which—EPA's new National Ambient Quality Standard for Lead (43 Fed. Reg. 46246-63 (Oct. 5, 1978))—*by itself* jeopardizes the economic viability of the major lead industries.[12]

It is impossible to square OSHA's failure to estimate compliance costs with the statutory requirement that standards must be feasible, and the decision of the Court of Appeals upholding the Standard is in conflict with decisions of other circuits requiring that such estimates be made. *See, e.g., RMI Co. v. Secretary of Labor,* 594 F.2d 566 (6th Cir. 1979); *American Petroleum Institute v. OSHA,* 581 F.2d 493, 502-03 (5th Cir. 1978), *aff'd on other grounds sub nom. Industrial Union Dep't v. American Petroleum Institute,* 448 U.S. ____, 100 S.Ct. 2844 (1980).

Nor does the decision of the Court of Appeals come to grips with the statutory requirement that OSHA's decisions be supported by "substantial evidence" and "the best available evi-

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11 OSHA concedes that it did "not undertake a formal analysis of cost of compliance" (54496/3), did not prepare "cost estimates" for the Standard (OSHA Ct. App. Br. at 222), and did not have sufficient data to derive a "meaningful quantification of cost" (52981/3). Significantly, neither OSHA nor the lower court was ever able even to estimate the dollar cost of compliance with the PEL of 50 ug/m^3 or the MRP provision. *What little discussion there is in OSHA's explanatory preamble and the majority opinion about OSHA's "estimates" invariably involves the agency's unsupported conclusions concerning the cost of meeting the* proposed *PEL of 100 ug/m3,* not *the 50 ug/m3 PEL actually adopted. See, e.g.,* Maj. Op. at 166a-68a.

12 *See, e.g.,* American Metal Market (Oct. 13, 1978)(senior EPA economist acknowledges that the new EPA standard may "virtually wipe out the domestic secondary lead industry").

dence." On the contrary, the lower court sidesteps the evidentiary gap in the record by reading the "best available evidence" rule in Section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5), to refer solely to the evidence that happened to be "available" in the record, whatever that evidence might be—good, bad or non-existent. *See, e.g.*, Maj. Op. at 147a-48a, 170a n.133. But none of the opinions in the Benzene Case even remotely suggests that the "best available evidence" rule permits OSHA to relieve itself of its burden to establish feasibility simply by gathering evidence on one proposed standard and then promulgating another standard for which it finds, not surprisingly, that the record contains no "available" evidence. *See, e.g.*, Justice Powell's concurrence at 100 S.Ct. 2876 ("the statutory preference for the 'best available evidence' . . . implies that OSHA must use the best known techniques for . . . accurate estimation . . . when such techniques are available"). To hold that the "best available evidence" rule excuses such an abdication of responsibility is, as the dissent states, "patently irresponsible" and "ludicrous". Diss. Op. at 273a. *See also Texas Independent Ginners Ass'n v. Marshall, supra*, 630 F.2d at 413 n.48 (OSHA must "consider . . . evidence that [is] available and . . . perform . . . research and experiments that [are] practicable").

The panel majority also relied on the "speculative nature of the technology" that industry must develop as an excuse for OSHA's failure to estimate the costs of compliance. Maj. Op. at 179a, 170a. With this approach, the weaker the proof of technological feasibility and the more impossible the task of compliance, the less demanding is OSHA's burden of proof on economic feasibility. Carried to its logical conclusion, the majority's reasoning would allow OSHA to forego *any* attempt to demonstrate economic feasibility if OSHA merely hints that someone may some day invent the technology necessary to meet a proposed standard.

C. The panel majority misinterpreted the "reasonably necessary" requirement by allowing OSHA to adopt a standard without establishing that the standard would produce any health benefits and without conducting any cost-benefit or cost-effectiveness analyses.

Misinterpreting this Court's rulings in the Benzene Case, the Court of Appeals upheld the lead Standard despite OSHA's concession that the agency had not determined, and could not "meaningfully" evaluate, what health benefits, if any, would result from the new regulation. Without such an evaluation, it was impossible for OSHA to establish that the Standard is "reasonably necessary . . . to remedy a significant risk of material health impairment," as required by the Benzene Case. 100 S.Ct. at 2863.[13] The agency acknowledged that,

> ". . . the available data does not allow meaningful quantitative estimation of the degree of prevention of the different forms of health damage likely to be achieved by lowering worker air exposures and blood lead levels by various amounts for various periods of time." (54427/1)

Translated into plain English, OSHA was saying, "We are unable to estimate the health benefits, *if any*, that would be achieved by reducing the air-lead exposure limit to the level set in the new Standard." [14] Indeed, the majority below acknowl-

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13 The panel majority candidly admits that for some industries there is little or no record evidence that workers are actually exposed to lead, and acknowledges that exposure in other industries is intermittent. Maj. Op. at 215a, 225a-26a, 227a. If this Court's decision in the Benzene Case is to have any meaning, "significant risk" cannot exist where exposure is intermittent, minimal or non-existent. Furthermore, no threshold finding about "significant risk" can have been made for the several industries which were "never even mentioned in the Preamble" (Maj. Op. at 224a n.162) but which are nonetheless subjected to most aspects of the Standard.

14 Although OSHA did purport to analyze "the likely *distribution* of blood-lead levels among workers" at various air-lead levels (Maj. Op. at 111)(emphasis in original), its statement that it did not evaluate "*health* damage" at the different PEL's was a candid admission that those distributions could not be translated into meaningful health data for purposes of the findings required by the Benzene Case.

edges that there is no evidence of "the actual incidence of significant health effects at the old and new PEL's." Maj. Op. at 110a. Even if OSHA had attempted to evaluate "the different forms of health damage likely to be achieved by lowering" the permissible air-lead level, the agency's own statements confirm that OSHA adopted the exposure limit of 50 ug/m³ not to protect workers against "a significant risk of material health impairment" but to prevent biological "effects" which occur in the "*absence* of illness" (52964/1, 54413/2). *See* Maj. Op. at 115-16 ("here . . . OSHA is acting to prevent, not overt early symptoms of a disease, but subclinical effects"); *id.* at 128 (OSHA's "blood-lead level goal . . . ultimately rests on its theory of subclinical effects").

The majority decision is also in direct conflict with decisions of the Courts of Appeals for the Fifth, Sixth and Seventh Circuits, holding that OSHA must "determine whether the benefits expected from a standard bear a reasonable relationship to the costs imposed by the standard." *Texas Independent Ginners Ass'n v. Marshall*, *supra*, 630 F.2d at 411; *American Petroleum Institute v. OSHA*, *supra*, 581 F.2d at 503; *RMI Co. v. Secretary of Labor*, 594 F.2d 566 (6th Cir. 1979); *Turner Co. v. Secretary of Labor*, 561 F.2d 82 (7th Cir. 1977). The agency, of course, made no such determination in this case. OSHA also rejected out of hand, without any cost-effectiveness analysis, an industry-suggested approach—one which many of OSHA's own witnesses supported—based on a biological compliance mechanism. In addition, despite its admission that respirators, properly used and maintained, protect workers (*e.g.*, 54457/1) and will be required in many operations *regardless of technological improvements* (*e.g.*, 54482/2, 54483/3, 54484/3), OSHA did not conduct any cost-effectiveness analysis to compare the costs of, and benefits from, using respirators as opposed to more expensive and frequently wasteful approaches.

OSHA's statutory obligation to conduct cost-benefit and cost-effectiveness analyses, and to determine that a standard is "reasonably necessary" to remedy "significant risk[s] of material health impairment", does not involve a callous disregard

for workers' health. Rather, it is an obligation that is inherent in OSHA's basic charter to protect workers' health, since every dollar wasted on infeasible engineering controls is a dollar that is unavailable to accomplish actual benefits through more efficient alternatives. The Act thus simply reflects a recognition by Congress that capital resources are finite and must be allocated in a rational way. *See RMI Co. v. Secretary of Labor, supra*, 594 F.2d at 573. As Mr. Justice Powell explained in his concurrence in the Benzene Case, the comparison of costs and benefits is required because,

> "OSHA's reading of § 6(b)(5) could force the depletion of an industry's resources in an effort to reduce a single risk by some speculative amount, even though other significant risks remain unregulated." 100 S.Ct. at 2878 n.7.
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> "The cost of complying with a standard may be 'bearable' and still not be reasonably related to the benefits expected. A manufacturing company, for example, may have financial resources that enable it to pay the OSHA-ordered costs. But expenditures for unproductive purposes may limit seriously its financial ability to remain competitive and provide jobs." *Id.* at 2877 n.4.

However liberally the "substantial evidence" and "best available evidence" tests are read, one thing is certain: as the expected cost or potential impact of particular OSHA requirements increases, there is a corresponding need for OSHA to act on the basis of fact, rather than compounded assumptions. But unless OSHA is required to conduct cost-benefit and cost-effectiveness analyses to balance known facts against speculation, risks against gains, and to articulate fully why a particular approach is reasonably necessary *in relation to others*, a reviewing court has no basis on which to determine whether the agency's action has been arbitrary or unreasonable. *See, e.g., Texas Independent Ginners Ass'n v. Marshall, supra*, 630 F.2d at 412 ("OSHA's refusal here to estimate the expected benefits of its . . . regulations . . . requires the conclusion that the

agency has not shown these regulations to be reasonably necessary on the basis of substantial evidence").

The need for cost-benefit and cost-effectiveness analyses becomes all the more pressing when, as here, OSHA would compel major industries to rebuild their plants completely to accommodate speculative technologies (*e.g.*, 52978-79, 52981-82, 54480, 52979/3), technologies that may never be developed or accomplish the desired end. Moreover, even were these speculative technologies successful, OSHA acknowledges that employers will still have to use respirators in many hard-to-control operations in order to protect workers' health (54482/2, 54483/3, 54484/1, 54484/3, 54488/3, 54490/2-3).

D. The panel majority ignored the language and legislative history of the Act, and misinterpreted this Court's ruling in *Whirlpool*, in concluding that OSHA has authority to require employers to provide full earnings protection and job security to all workers in the lead industries.

OSHA has no statutory authority to require employers to adopt a medical removal protection program that would require *full* earnings to be paid to all workers removed from exposure for "safety" reasons, including workers who are not ill or incapacitated and for whom alternate positions are not available.[15] That, however, is what OSHA has done.

OSHA's authority under the Act to adopt regulations dealing with "working conditions" and safe or healthful "places of employment" is not a license for OSHA to regulate any and every aspect of employment that OSHA happens to believe may have some incidental impact on worker health or safety. There is a fundamental difference between ordering an em-

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15 The Court granted certiorari in the Cotton Dust Case on a wage guarantee issue materially different from that presented in the case at bar. *See* footnote 7 *supra* and accompanying text. Thus, even if the wage guarantee provision in the cotton dust standard were upheld (and it should not be), that decision would not dispose of the issue here.

ployer to provide biological monitoring and medical surveillance programs for his employees, on the one hand, and requiring that he make payments designed (as OSHA concedes (54441/2)) to induce recalcitrant employees to participate in those programs, on the other. Indeed, the absence of any legitimate relationship between MRP earnings protection and health objectives is dramatically underscored by the fact that an employee is entitled to full earnings protection even when he has *refused to participate* in the employer's protective medical programs (54470/2). Such nonmedical payments are hardly the kind of expenses contemplated by Congress when it imposed on employers the "costs . . . [of] meeting the [health] standards . . . established" under the Act. As this Court emphasized in *Whirlpool Corp. v. Marshall*, 445 U.S. 1, 18 (1980), "Congress very clearly meant to reject a law unconditionally imposing upon employers an obligation to continue to pay their employees their regular pay checks when they absented themselves from work for reasons of safety." The MRP provision in the lead Standard imposes just such an obligation.

The MRP provision is inconsistent not only with this Court's reasoning in the *Whirlpool* case but also with the language of the Act itself. Section 4(b)(4) specifies that "[n]othing" in the Act "shall be construed to supersede or in any manner affect any workmen's compensation law . . . ." 29 U.S.C. § 653(b)(4). The MRP/earnings protection requirement in the Standard, however, "affects" and "supersedes" workmen's compensation schemes by enlarging benefits for those who might have compensable illnesses and by providing benefits for those who, although not ill, may exhibit subclinical effects sometimes associated with lead exposure. The majority admits that the MRP/earnings protection program would replace existing workmen's compensation laws as a "practical" matter (Maj. Op. at 79a). It nevertheless suggests that the language of Section 4(b)(4) is inapplicable because it is meant to prohibit only OSHA standards that have a "*legal*"—as opposed to "*practical*"—impact on workmen's compensation laws. Maj. Op. at 79a. The majority's interpretation belies common sense, distorts the language of the Act, and ignores Congress' careful

deference to state laws, laws that invariably recognize the dangers inherent in paying an employee 100 percent of his salary for not working.

E. OSHA denied the industry petitioners due process of law by failing to give them adequate notice of the rulemaking proceedings and by relying on secret, post-hearing studies by independent, expert consultants.

(1) **Inadequate Rulemaking Notice.** The majority upheld OSHA's violation of petitioners' statutory and constitutional rights to adequate rulemaking notice by permitting the agency to promulgate a Standard which was totally different from the regulation proposed and concerning which virtually no evidence had been received. This case raises starkly a basic question concerning the nature of OSHA's obligation to give interested parties adequate notice of proposed rulemaking. Simply put, can OSHA, merely by stating in boilerplate language that a proposed regulation may not provide adequate margins of safety, adopt a health standard materially different from and more stringent than the one proposed?

The court below admits that the difference between the proposed standard of 100 ug/m^3 and the final Standard of 50 ug/m^3 is "obviously substantial", enlarges the number of employees affected, and "greatly increases" the "standard's economic and technological demands on industry." Maj. Op. at 46a-47a. Nevertheless, the majority concludes that the OSHA notice "adequately informed" interested persons of the substance of the vastly different and more stringent final rule.[16]

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16 The statutory authority for promulgation of the lead Standard, 29 U.S.C. § 655(b)(2), provides for a notice-and-comment procedure markedly different from its familiar Administrative Procedure Act equivalent, 5 U.S.C. § 553(b). The APA requires only that "general notice" of either "the terms or substance" of the proposal be published in the Federal Register. The counterpart in the OSHA Act, however, requires that the "proposed rule" itself be published in the Federal Register. *See Synthetic Organic Chemical Mfrs. Assoc. v. Brennan*, 506 F.2d 385, 389 (3d Cir. 1974), *cert. denied*, 423 U.S. 830 (1975). OSHA did not observe that requirement in this case.

To support this conclusion, the majority opinion cites various statements in the notice which it claims "portended" the course OSHA eventually steered. Maj. Op. at 47a. These "portents", as the record indicates, were wholly inadequate.[17] OSHA admits that the record is virtually devoid of evidence on the technological feasibility or health benefits of a level of 50 ug/m³ and that the record contains nothing at all on the economic feasibility of such a level. As the dissent cogently argues,

> "That no such evidence was offered by anyone during the extended hearings, especially considering the intensity of the participants' adversarial positions, constitutes the best support for concluding that the 50 ug/m³ level was *not* a 'logical out-growth' of the Notice of the Rulemaking proposal of a '100 ug/m³ . . . level.' " Diss. Op. at 256a (emphasis in original).

Adequate notice would obviously have generated a dramatically different record, both on the technological and economic feasibility of the Standard and on the other issues presented by petitioners.[18] OSHA should not be permitted to follow a system of notice-by-ambush that denies due process to parties in OSHA rulemaking proceedings and makes it impossible for the agency to obtain the "substantial evidence" necessary for an informed decision.

(2) ***Ex Parte* Expert Evidence.** Ignoring the clear mandate of decisions such as *Home Box Office, Inc. v. FCC*, 567 F.2d 9

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17 These statements included, for example, OSHA's open-ended inquiry whether an exposure level of 100 ug/m³ "incorporates an appropriate margin of safety". As the dissent correctly observes (Diss. Op. at 257a), OSHA could just as easily argue that these statements justified a standard of zero.

18 The majority argues—without any factual or logical foundation whatsoever—that since the industry petitioners claimed that 100 ug/m³ was infeasible, they would have made the same arguments, *without offering additional evidence*, concerning 50 ug/m³. Maj. Op. at 55a. This is patent nonsense. The investigations and evidence concerning feasibility would obviously have been considerably different had petitioners been apprised of the agency's intentions.

(D.C. Cir.), *cert. denied*, 434 U.S. 829 (1977); *United States Lines, Inc. v. FMC*, 584 F.2d 519 (D.C. Cir. 1978); and *National Small Shipments Traffic Conference, Inc. v. ICC*, 590 F.2d 345 (D.C. Cir. 1978), the court below condoned OSHA's use of secret post-hearing reports (concededly the *only* evidence considered by OSHA on the feasibility of a PEL of 50 ug/m³ (Maj. Op. at 45a)) by certain witnesses who had previously testified at OSHA's request as independent experts during the hearings. The majority did so on the grounds that,

(a) the industry petitioners purportedly failed to show that the reports, which they have never seen and which they were unable to secure under the Freedom of Information Act, contained data that were not in the public record,[19] and

(b) there is "no *functional* difference" between post-hearing deliberations involving permanent in-house staff and those involving independent consultants, even when those consultants are expert witnesses who, for substantial fees (Burton was paid more than $243,000 for his work), had previously taken positions with respect to disputed critical facts concerning the proposed air-lead exposure limit of 100 ug/m³ and who obviously had a vested professional and economic interest in defending the accuracy of their studies and opinions. Maj. Op. at 39a, 43a.

As the dissent explained (Diss. Op. at 250a-52a), the fallacies inherent in such rationales are obvious.

There can be no question about the prejudicial impact of these *ex parte* reports. Both admittedly influenced OSHA's decisions. As OSHA acknowledged when opposing LIA's FOIA request for the documents,

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19 The mere fact that the consultants were experts meant that their opinions, views and evaluations constituted new evidence, regardless of whether these experts did or did not rely upon materials outside the record. In any event, the contracts referred to documents outside the record and requested "additional research" and "material supplementary" to the experts' testimony. Maj. Op. at 41a-42a. *See* Diss. Op. at 252a ("the secret reports were *not* cumulative of the record evidence . . . [and] may have included extra-record evidence").

> "[T]he dispositive fact is that *the memoranda unquestionably were used by OSHA* in its 'on the record' rulemaking deliberations." OSHA Reply Br. at 4, *Lead Industries Association, Inc. v. OSHA*, 610 F.2d 70 (2d Cir. 1979). *See also* Maj. Op. at 45 ("the post-hearing contract with . . . [Burton] was OSHA's first attempt to obtain expert advice directly addressing the feasibility of the 50 ug/m³ standard").

The majority's decision is therefore flatly inconsistent with earlier decisions by the courts of appeals and with this Court's decision in *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402 (1971), requiring the *entire* record to be available. Without such a record, no court can perform the searching and careful review called for by the OSHA Act, by due process, and by the need to protect against the arbitrary exercise of administrative discretion.

Conclusion

For the foregoing reasons, this petition for a writ of certiorari should be granted and the partial stay issued by the Court on December 8, 1980, should remain in effect pending review by the Court.

Dated: January 7, 1981

Respectfully submitted,

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APPENDIX

Opinion of the United States Court for the District of Columbia Circuit

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United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 79-1048

UNITED STEELWORKERS OF AMERICA, AFL-CIO-CLC, PETITIONER *

v.

F. RAY MARSHALL, Secretary of Labor, United States Department of Labor, and Doctor EULA BINGHAM, Assistant Secretary for Occupational Safety and Health, United States Department of Labor, RESPONDENTS *

CAST METALS FEDERATION, INTERNATIONAL UNION, UNITED AUTOMOBILE, AEROSPACE AND AGRICULTURAL IMPLEMENT WORKERS OF AMERICA, UNITED STEELWORKERS OF AMERICA, AFL-CIO-CLC *et al.*, SHIPBUILDERS COUNCIL OF AMERICA, OIL, CHEMICAL AND ATOMIC WORKERS INTERNATIONAL UNION, AFL-CIO, DIXIE METALS COMPANY, NATIONAL CONSTRUCTORS ASSOCIATION, GENERAL MOTORS CORPORATION, BUNKER HILL COMPANY, STANDARD INDUSTRIES, and SCHUYKILL METALS CORPORATION, INTERVENORS

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* Consolidated with the following cases (identified by this circuit's case number and petitioner), in all of which the Department of Labor and its Occupational Safety and Health

Petitions to Review the Occupational Health Standard for Lead Promulgated by the Secretary of Labor

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Argued November 1, 1979

Decided August 15, 1980

George H. Cohen, with whom *James M. Harris*, *Julia Penny Clark*, *Robert M. Weinberg*, *Norman M. Berger*, *Mary Win-O'Brien*, and *James D. English* were on the brief, for petitioner United Steelworkers of America, AFL-CIO-CLC, and for intervenors Dixie Metals Company, General Motors Corporation, Bunker Hill Company, Standard Industries, United Steelworkers of America, AFL-CIO-CLC, and Schuykill Metals Corporation.

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Administration are the respondents: No. 79-1054, American Iron and Steel Institute *et al.*; No. 79-1078, Lead Industries Association, Inc. *et al.*; No. 79-1079, Battery Council International; No. 79-1080, ASARCO Incorporated; No. 79-1081, Southwire Company; No. 79-1082, National Paint and Coatings Association, Inc. *et al.*; No. 79-1083, PPG Industries, Inc.; No. 79-1084, South Central Bell Telephone Company *et al.*; No. 79-1106, General Motors Corporation; No. 79-1107, Ford Motor Company; No. 79-1108, Chrysler Corporation; No. 79-1111, National Association of Recycling Industries, Inc. *et al.*; No. 79-1114, Ethyl Corporation; No. 79-1120, Corning Glass Works; No. 79-1121, St. Joe Minerals Corporation; and No. 79-1146, RSR Corporation.

Elroy H. Wolff and *Linda S. Peterson* were on the brief for petitioners Battery Council International *et al.*

Thaddeus Holt, *William J. Kilberg*, and *Lawrence Z. Lorber* were on the brief for petitioner ASARCO Incorporated.

William K. Hearnburg and *James W. Kesler* were on the brief for petitioner Southwire Company.

Richard O'Brecht and *Bruce Hamil* were on the brief for petitioners National Paint and Coatings Association, Inc. *et al.*

Hugh M. Finneran and *Horace A. Thompson, III* were on the brief for petitioner PPG Industries, Inc.

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Robert V. Zener and *Edward J. Dilworth, Jr.* were on the brief for petitioners General Motors Corporation, Ford Motor Company, and Chrysler Corporation.

Edward L. Merrigan, with whom *Edward F. Schiff* and *David A. Donohue* were on the brief, for petitioners National Association of Recycling Industries, Inc. *et al.*

Joseph C. Carter, Jr., *David F. Peters*, *John J. Adams*, and *Horace A. Thompson, III* were on the brief for petitioner Ethyl Corporation.

Dennis K. Kade, Assistant Counsel for Appellate Litigation, Department of Labor, and *Benjamin W. Mintz*, Associate Solicitor for Occupational Safety and Health, Department of Labor, a member of the bar of the Supreme Court of the United States, *pro hac vice*, by special leave of court, with whom *Allen H. Feldman*, Acting Counsel for Appellate Litigation, Department of Labor,

Nancy L. Southard, Acting Assistant Counsel for Appellate Litigation, Department of Labor, and *Richard L. Gross*, Attorney, Department of Labor, were on the brief, for respondents.

Robert S. Moran was on the brief for intervenor Cast Metals Federation.

Claude D. Montgomery, with whom *John A. Fillion*, *Judith A. Scott*, and *M. Jay Witman* were on the brief, for intervenor International Union, United Automobile, Aerospace and Agricultural Implement Workers of America.

Alan J. Topal and *Steven S. Rosenthal* were on the brief for intervenor Shipbuilders Council of America.

Robert Stulberg, with whom *Girardeau A. Spann* and *William B. Schultz* were on the brief, for intervenor Oil, Chemical and Atomic Workers International Union, AFL-CIO.

Vincent J. Fuller and *Peter J. Kahn* were on the brief for intervenor Dixie Metals Company.

Stephen C. Yohay, with whom *Anthony J. Obadal* and *Steven R. Semler* were on the brief, for intervenor National Constructors Association.

Edwin H. Seeger, *Carl B. Nelson, Jr.*, and *John T. Golden* were on the brief for intervenor Bunker Hill Company.

Frank M. Coates, Jr. was on the brief for intervenor Schuykill Metals Corporation.

James R. Richards was on the brief for *amicus curiae* Capital Legal Foundation urging that the lead standard be declared invalid.

Marjorie Elizabeth Cox was on the brief for *amici curiae* California Department of Industrial Relations *et al.* urging affirmance.

Wendy B. Kloner and *Douglas L. Parker* were on the brief for *amici curiae* Women's Legal Defense Fund *et al.* urging affirmance.

Before WRIGHT, *Chief Judge*, and ROBINSON and MACKINNON, *Circuit Judges*.

Opinion for the court ** filed by *Chief Judge* WRIGHT.

Dissenting opinion filed by *Circuit Judge* MACKINNON.

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WRIGHT, *Chief Judge*: In November 1978 the Occupational Safety and Health Administration (OSHA), exercising its authority and responsibility under Section 6 of the Occupational Safety and Health Act, 29 U.S.C. § 655 (1976), issued new rules designed to protect American workers from exposure to airborne lead in the workplace.[1] In these consolidated appeals petitioners representing both labor union and industry interests challenge virtually every aspect of the new lead standard and the massive rulemaking from which it emerged.[2]

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[1] The new standard appears at 43 FED. REG. 53007 (1978), with minor amendments at 44 FED. REG. 5446 (1979), and at 29 C.F.R. § 1910.1025 (1979). The Preamble to the standard appears at 43 FED. REG. 52952-53007 (1978), with Attachments, which we shall refer to as part of the Preamble, at 43 FED. REG. 54354-54509 (1978). In the interest of simplicity, we shall cite the Preamble only by page and column number for Volme 43 of the Federal Register, and the final lead standard only by section number for Title 29 of the 1979 edition of the Code of Federal Regulations.

The Secretary of Labor has delegated his authority to set standards under 29 U.S.C. § 655 (1976) to the Assistant Secretary of Labor for Occupational Safety and Health, who is the head of OSHA. For purposes of this opinion, the words "Secretary," "agency," and "OSHA" are interchangeable.

[2] By order of March 1, 1979 this court agreed to stay certain portions of the new lead standard pending outcome of this appeal. Our summary at the end of this opinion identifies parts of the stay which shall remain in effect for certain industries while OSHA reconsiders certain issues on remand.

The unions[3] claim that OSHA has failed to carry out its statutory duty to ensure that "no employee will suffer material impairment of health * * *." *Id.* § 655(b)(5).[4] The industry parties[5] charge OSHA with almost every procedural sin of which an agency can be guilty in informal rulemaking, attack some of the most important substantive provisions of the standard as exceeding

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[3] Briefs in opposition to portions of the standard were filed by the United Steelworkers of America (USWA) and intervenor Oil, Chemical and Atomic Workers International (OCAW). USWA, however, joined by the United Automobile Workers, also filed a reply brief defending the new lead standard against the challenges posed by the industry parties. Two *amici* briefs supporting employee interests were also filed, in behalf of California state employment agencies and women's rights and civil rights groups, both briefs solely devoted to supporting the OSHA provision for medical removal protection.

[4] Because we find the union arguments that attack the standard without any notable merit, while the industry challenges pose extremely substantial questions of law and fact, we address the union arguments only very briefly near the end of this opinion.

[5] The central industry brief opposing the standard was filed by Lead Industries Association, Inc. (LIA), representing all affected industries except those which OSHA has placed in the category of "other industries," *see* Part VII-B-8 *infra*. Industry briefs challenging OSHA were also filed by the American Iron & Steel Institute (AISI), representing some of those "other industries"; the National Association of Recycling Industries, Inc. (NARI), representing the secondary lead smelters as well as recyclers of non-lead metals; the three major domestic automobile manufacturers—Chrysler, Ford, and General Motors; and the Bell System. *Amicus* Capital Legal Foundation filed a brief opposing the medical removal provision. Intervenor National Construction Association filed a brief supporting OSHA's decision to exempt the construction industry from the new lead standard. This opinion will frequently refer to LIA as the source of industry arguments made by that party as well as other industry parties.

OSHA's statutory authority, and assert that the agency has failed to present substantial evidence to support the factual bases of the standard. Though the numerous challenges to the standard and the size and complexity of the rulemaking require of us a lengthy analysis of the issues, we affirm most of the new occupational lead standard, remanding to the agency for reconsideration only the question of the feasibility of the standard for a number of the affected industries.[6]

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[6] The summary at the end of this opinion explains the terms of the remand and lists the industries for which the question of feasibility remains open on remand.

The dissenting opinion takes strong opposition to our views on such important issues as the role of the consultants in the rulemaking, the adequacy of notice in the rulemaking, the statutory validity of the medical removal protection program, and the technological and economic feasibility of the standard. As we acknowledge at several points in this opinion, OSHA's procedures and evidence-gathering were less than perfect, and a number of important questions on appeal are very close. We believe, however, that the Supreme Court's unanimous opinion in *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519 (1978), requires us to be especially wary of imposing on the agency any procedural or evidentiary constraints beyond those explicitly established by Congress in the OSH Act. Therefore, though we recognize that the dissent has raised serious questions about a number of aspects of the rulemaking, we disagree with its conclusions. However, in as complex and unwieldy a case as this, we think it impractical and unnecessary to respond to the dissent in a point-by-point fashion. Rather, we believe our extensive discussions of the key issues adequately explain our reasons for rejecting the dissent's views. *See infra* Part III-C (Improper Use of Consultants); Part III-D & E (Notice of Rulemaking & Denial of Cross-Examination); Part IV-A (Medical Removal Protection); Part VII (Feasibility of the Lead Standard).

I. BACKGROUND

Lead exists naturally in the earth's crust, the atmosphere, and the hydrosphere. For thousands of years human beings have found lead crucial to the manufacture of a vast number of essential products. For centuries we have recognized the health hazards of such use. We learned long ago that lead absorption through inhalation and ingestion could cause printers to lose movement in their fingers, and pottery and glass workers to suffer the "dry grippe." For almost a century we have known that excessive lead absorption can injure the kidneys and the peripheral and central nervous systems of painters, plumbers, and industrial workers. 52952/3. We do not know to a scientific certainty the precise levels of air-lead exposure or blood-lead content at which different lead-induced diseases occur. That question, indeed, has been central to this rulemaking.[7] We do know that in the United States today, where industry consumes annually over one million tons of lead, at least 800,000 workers, representing 120 occupations in over 40 industries, are exposed to airborne lead on the job and thereby face the dangers of lead poisoning.

As scientific means for measuring lead exposure and lead absorption have improved over the last 50 years, scientists and the government have set lower and lower figures for the maximum tolerable level of airborne lead exposure, but have struggled in setting a precise permissible exposure limit (PEL). A PEL of 500 ug/m^3 (500

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[7] Two of our recent opinions have discussed the presence of lead in the atmosphere and the health hazards posed by lead absorption, *Lead Industries Ass'n, Inc. v. EPA*, —— F.2d ——, —— (D.C. Cir. No. 78-2201, decided June 27, 1980) (slip op. at 4-5); *Ethyl Corp. v. EPA*, 541 F.2d 1, 7-9 (D.C. Cir.) (*en banc*), *cert. denied*, 426 U.S. 941 (1976), though both of these cases involved review of EPA regulations under the Clean Air Act dealing with the threat of lead in the general environment.

micrograms of lead per cubic meter of air) was once the consensus figure, but in 1933 the United States Public Health Service recommended, and many industries at least theoretically adopted, a goal of 150 ug/m³. In 1957 the American Conference of Governmental Industrial Hygienists increased the recommended maximum to 200 ug/m³, but in 1971 lowered it once again to 150 ug/m³. Joint Appendix (JA) 1487-1491; 52952/3-52953/1. However, in that same year, 1971, the newly created Occupational Safety and Health Administration, acting without rulemaking under Section 6(a) of the OSH Act, 29 U.S.C. § 655(a) (1976), adopted the "national consensus standard" recommended by the American National Standards Institute, which set a PEL, measured as an eight-hour time-weighted average, of 200 ug/m³. Two years later the Director of the National Institute for Occupational Safety and Health (NIOSH) advised the Secretary of Labor to lower the PEL to 150 ug/m³ yet again, and two years after that, in August 1975, the NIOSH Director suggested that the Secretary lower the PEL still further.

In response, on October 3, 1975 OSHA published notice of a proposed new standard for occupational lead exposure, which combined a PEL of 100 ug/m³ with detailed rules for environmental monitoring, employee medical surveillance and training, and other health and safety measures. 40 FED. REG. 45934 (1975).[8] OSHA conducted public hearings in March, April, and May, and then again in November and December, 1977, and closed the record on August 8, 1978. It then issued the final standard, which differed from the proposed standard most noticeably in setting the final PEL at 50 ug/m³.

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[8] OSHA later issued supplemental notices of rulemaking, 42 FED. REG. 808, 46547 (1977), the latter inviting comments on medical removal protection.

Since most of the important provisions of the standard are on appeal, we will carefully explain these provisions and, where relevant, the parallel provisions in the proposed standard, as we address petitioners' separate claims. However, we proceed now to summarize very briefly the scheme of the new lead standard.

The final standard restricts employee exposure to metallic lead, inorganic lead compounds, and organic lead soaps, 53007/2; § 1910.1025(b), and applies to almost all workplaces.[9] The general scheme of the standard resembles that of earlier OSHA standards.[10] It sets a PEL of 50 ug/m^3 and an "action level" of 30 ug/m^3. Sections 1910.1025(b), (c)(1).[11] To determine whether exposure in any workplace exceeds the PEL or the action level, the employer must use environmental monitoring to measure airborne lead at least every six months or whenever changes in operations may alter lead exposures, and must warn employees whenever airborne lead exceeds the PEL. Section 1910.1025(d).

All affected employers must meet the 50 ug/m^3 PEL immediately through some combination of engineering controls, work practice or administrative controls,[12] and

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[9] The standard exempts construction workers and agricultural workers. Section 1910.1025(a)(2). On August 23, 1979 OSHA issued a corrective amendment to this section, explaining that the standard exempts regular employees of the construction industry, but not employees of other industries who do construction work. OSHA Brief, Addendum A.

[10] *E.g.*, 29 C.F.R. § 1910.1001 (1979) (asbestos); *id.* § 1910.1017 (vinyl chloride); *id.* § 1910.1043 (cotton dust).

[11] The "action level" is the level of airborne lead concentration which triggers the employer's responsibility to institute medical surveillance and biological monitoring. *See* § 1910.1025(j).

[12] Engineering controls alter the industry's machines, processes, materials, or products to reduce lead exposure at

supplemental respirators. However, the industries face deadlines, ranging from one to ten years, by which they must meet first an interim PEL of 100 ug/m³ and then the final PEL of 50 ug/m³ solely through engineering and work practice controls. The deadlines for each industry are determined by OSHA's sense of that industry's technological and economic capacity for change. Section 1910.1025(e)(1).[13] The precise meaning and practical consequences of these rules on methods of compliance are among the most important issues in this appeal, and we consider them below when we review OSHA's finding that the standard is feasible.

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its source. 52989/3. Work practice or administrative controls are those controls, other than personal respirators, which protect employees from the lead which does escape into the workplace. They include rotation of employees, housekeeping and cleaning, and personal hygiene. *Id.*

[13] The phase-in schedule appears in Table I, § 1910.1025(e):

Industry [1]	Compliance dates [2]		
	200 ug/m³	100 ug/m³	50 ug/m³
Primary lead production	([3])	3	10
Secondary lead production	([3])	3	5
Lead-acid battery manufacturing	([3])	2	5
Nonferrous foundries	([3])	1	5
Lead pigments manufacturing	([3])	3	5
All other industries	([3])	0	1

[1] Includes ancillary activities located on the same worksite.

[2] Expressed as the number of years from the effective date by which compliance with the given airborne exposure level, as an 8-hour TWA, must be achieved.

[3] On effective date.

This key provision of the lead standard is based on OSHA's view that respirators are an inferior and inadequate means of protecting workers. 52990/2-3.

Employers must also file written plans describing the means by which they intend to achieve the PEL without relying on respirators. Section 1910.1025(e)(3). Until these plans are carried out, and whenever engineering controls and work practice controls fail by themselves to achieve the PEL, employees must receive and wear respirators, §§ 1910.1025(e)(2), (f), use of which OSHA has carefully governed by strict rules on selecting, fitting, and testing, § 1910.1025(f). Moreover, where lead exposure exceeds the PEL, the employer must give the employees protective work clothing and equipment, § 1910.1025(g), and in all workplaces the employer must follow rigorous rules on housekeeping and hygiene, §§ 1910.1025(h), (i).

Whenever exposure in a workplace exceeds the action level for more than 30 days in a year, the employer must supplement environmental monitoring with biological monitoring and medical surveillance. Under these rules the employer must measure employees' blood-lead levels at periodic intervals determined by the magnitude of the employees' initial or most recent measured level, § 1910.1025(j)(2), and must also give all employees medical examinations to determine whether the employees suffer or risk any bodily harm from lead exposure, § 1910.1025(j)(3). If an employee challenges the findings of a company physician's medical examination, the employer must pay for a second, and possibly a third, medical examination to assess the accuracy of the first examination, § 1910.1025(j)(3)(iii).

Under one of the most important and controversial parts of the standard, and one relatively without precedent in earlier standards, whenever biological monitoring reveals a worker has an abnormally high blood-lead level or whenever medical surveillance reveals that a worker may suffer actual physical impairment from lead exposure, the employer must remove the employee

from the workplace. Section 1910.1025(k). Under this medical removal protection (MRP) provision, the employer may place the removed worker in another, low-exposure, workplace or, if no such workplace is available, may have to place the worker on leave. But whatever the employer's choice, he must, during the period of removal, absolutely guarantee that the removed worker retain the earnings, benefits, and seniority rights of the job from which he was removed for at least 18 months, and the employer cannot return the employee to the original workplace until the lead-induced ailment disappears or the worker's blood-lead level shows significant reduction. Sections 1910.1025(k)(1)(iii)-(v), (k)(2).

Finally, the standard requires employers to create safety and health training programs for their lead-exposed workers, § 1910.1025(*l*), to keep detailed records on environmental monitoring in the workplace and on the biological monitoring and medical surveillance of individual workers, and to make those records available to workers and certain of their representatives, as well as to the government. Section 1910.1025(n).

II. Scope of Review

In our recent decision in the cotton dust case, *AFL-CIO v. Marshall*, —— F.2d —— (D.C. Cir. No. 78-1562, decided October 24, 1979), we dealt at length with the criteria for judicial review appropriate to so-called "hybrid rulemaking" in general, and to cases under the OSH Act in particular. In the present case we feel no need to reinvent the wheel by recounting the relevant legislative and judicial history of the OSH Act and the general background of hybrid rulemaking. Rather, we incorporate our analysis in the cotton dust case as the established and proper interpretation of our scope of review for OSHA cases. However, we summarize that analysis very briefly here.

Though the OSH Act adopts the "substantial evidence" test for judicial review, 29 U.S.C. § 655(f) (1976), rulemaking under that Act remains essentially informal. *AFL-CIO v. Marshall, supra,* —— F.2d at ——, slip opinion at 25:

> The tasks of this reviewing court are thus to ensure that the agency has (1) acted within the scope of its authority; (2) followed the procedures required by statute and by its own regulations; (3) explicated the bases for its decision; [and] (4) adduced substantial evidence in the record to support its determinations.

(Footnotes omitted.) Of course, we must rigorously review the agency's interpretations of the substantive provisions of its statutory mandate. Moreover, we must ensure that the agency has lived up to statutory and constitutional standards in its rulemaking procedure—a subject we address in the next part of this opinion. These, however, are conventional problems of judicial review. The peculiar problem of reviewing the rules of agencies like OSHA lies in applying the substantial evidence test to regulations which are essentially legislative and rooted in inferences from complex scientific and factual data, and which often necessarily involve highly speculative projections of technological development in areas wholly lacking in scientific and economic certainty. We noted in the cotton dust case that we do not pretend to have the competence or the jurisdiction to resolve technical controversies in the record, —— F.2d at ——, slip opinion at 25-28, or, where the rule requires setting a numerical standard, to second-guess an agency decision that falls within a "zone of reasonableness," *id.* at n.60, *quoting Hercules, Inc. v. EPA,* 598 F.2d 91, 107 (D.C. Cir. 1978); *see Industrial Union Dep't, AFL-CIO v. American Petroleum Institute,* —— U.S. ——, ——, 48 U.S. L. WEEK 5022, 5035 (July 2, 1980) (hereinafter cited to Law Week pages only) (plurality opin-

ion); *id.* at 5037 (Burger, C.J., concurring). Rather, our task is to "ensure public accountability," —— F.2d at ——, slip opinion at 27, by requiring the agency to identify relevant factual evidence, to explain the logic and the policies underlying any legislative choice, to state candidly any assumptions on which it relies, and to present its reasons for rejecting significant contrary evidence and argument. Generalization cannot usefully take us further. We will discuss other aspects of the proper scope of review as the need arises in our analysis of distinct issues in the case.

III. Procedural Claims

OSHA was occasionally careless or inefficient in its procedures throughout this rulemaking, and we readily concede that procedural purists will never place the lead standard in the Pantheon of administrative proceedings. Moreover, we concede that most of LIA's procedural claims raise difficult legal issues, and indeed force us to consider a number of important questions of informal rulemaking procedure that have not been fully resolved by this circuit in recent years. Nevertheless, we enter this area under two important restraints. First, as a legal matter, we generally have no power to impose extra-statutory procedural requirements on the agency unless it has violated the Constitution or flagrantly disregarded minimal principles of procedural fairness. *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519 (1978). Second, as both a legal and a practical matter, we must recognize the procedural flexibility inherent in informal rulemaking, as well as the difficulty an agency faces in managing hundreds of comments and witnesses and developing a coherent standard out of tens of thousands of pages of record evidence.

The OSH Act requires the agency to follow procedures more stringent than the minimal ones established in the Administrative Procedure Act, 5 U.S.C. § 553 (1976). Thus the agency must give interested parties the opportunity to request a public hearing on objections to a proposed rule, and must publish notice of the time and place for such hearing in the Federal Register. 29 U.S.C. § 655(b)(3) (1976). Moreover, the agency has added to these statutory procedures by rule. Thus OSHA itself requires a hearing examiner at oral hearings, who must provide an opportunity for cross-examination on important issues and offer interested persons verbatim transcripts of the hearing. 29 C.F.R. § 1911.15(b) (1979).

Nevertheless, Congress' decision to impose the substantial evidence test on OSHA does not alter the essentially informal character of OSHA rulemaking. *Industrial Union Dep't, AFL-CIO v. Hodgson*, 499 F.2d 467, 472-473 (D.C. Cir. 1974). Just recently, we emphasized that the presence of procedures beyond those mandated by Section 553 of the APA neither converts the essentially legislative process of informal rulemaking into something akin to adjudication, nor empowers courts to turn rulemakings into courtroom trials. *Ass'n of Nat'l Advertisers, Inc. v. FTC*, —— F.2d —— (D.C. Cir. No. 79-1117, decided December 27, 1979). Thus, as we examine the procedural claims in the lead proceeding, we must avoid imposing procedural constraints beyond those in APA Section 553, the OSH Act, and the Due Process Clause, and we remain bound by judicial construction of the demands of APA Section 553 as our source for the general principles of informal rulemaking.

Acting under these constraints, we ultimately find nothing illegal in OSHA's procedural conduct.

A. *Bias of the Decisionmaker*

LIA urges us to vacate the entire lead standard because, in its view, the official who ultimately set the standard, Assistant Secretary of Labor Eula Bingham, had prejudged the essential issues in the rulemaking proceeding. For proof of this allegedly fatal bias, LIA points to a speech Bingham delivered on November 3, 1978 to a United Steelworkers of America conference on occupational exposure to lead.

Bingham's speech began innocuously, if dramatically ("Brothers and Sisters"), by noting her concern for workers and by recognizing how much OSHA depended on their unique perspective when it gathered information in setting safety standards. But after asserting that she and Secretary of Labor Marshall were "determined" to have a lead standard, Bingham proceeded to suggest her predisposition on important issues. As to the medical removal protection provision (MRP):

> I think that there may be some apprehension because Assistant Secretaries in the past have not always understood, or have not known how to spell the words medical removal protection, or rate retention * * *. Well, I learned to spell those words a long time ago on the Coke Oven Advisory Committee, and if you want to know how I feel about it, you need only to look up my comments during those Committee hearings. As far as I'm concerned, it is impossible to have a Lead Standard without it. * * *

Appendix to Lodged Documents (ALD) 3. As to the dangers of lead:

> * * * I can tell you about a plant within 300 miles of the city where workers are told to go to the hospital from work and receive therapy that would drag out poison and precious metals. And then they're sent back to be poisoned again. I bet I could go down to the hospitals of this city and find a worker that

> is undergoing kidney dialysis, and I'll bet you a dinner that some of those workers have been in lead plants.

Id. at 4. As to economic feasibility:

> I have told some people that I have never aspired to be an economist, but I tell you I can smell a phony issue when I see one. And to say that safety and health regulations are inflationary is phony.
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> * * *
>
> * * * I don't understand a society such as ours who is not willing to pay a dollar more for a battery to insure that workers do not have to pay for that battery with their lives.

Id. at 5. The speech went on to urge workers "to control their own destiny" by educating themselves about the lead problem, and ended by calling for political support in the imminent congressional elections for candidates sympathetic to OSHA's goals. *Id.* at 9.

Were it our task to assess the wisdom and propriety of an administrator's public conduct, we might well admonish Dr. Bingham for this speech. She served her agency poorly by making statements so susceptible to an inference of bias, especially statements to a group so passionately involved in the proceedings. But our task is rather to measure her conduct against the legal standards for determining whether an official is so biased as to be incapable of finding facts and setting policy on the basis of the objective record before her. Moreover, we must bear in mind that this particular speech, though delivered five days before the Secretary of Labor signed the final standard and ten days before he released it, came 30 days after Bingham had effectively made her own decision on the standard and ten days after she had approved the final language.

An administrative official is presumed to be objective and "capable of judging a particular controversy fairly

on the basis of its own circumstances." *United States v. Morgan*, 313 U.S. 409, 421 (1941). Whether the official is engaged in adjudication or rulemaking, mere proof that she has taken a public position, or has expressed strong views, or holds an underlying philosophy with respect to an issue in dispute cannot overcome that presumption. *Hortonville Joint School District No. 1 v. Hortonville Educ. Ass'n*, 426 U.S. 482, 493 (1976); *United States v. Morgan, supra*, 313 U.S. at 421. Nor is that presumption overcome when the official's alleged predisposition derives from her participation in earlier proceedings on the same issue. *FTC v. Cement Institute*, 333 U.S. 683, 702-703 (1948). To disqualify administrators because of opinions they expressed or developed in earlier proceedings would mean that "experience acquired from their work * * * would be a handicap instead of an advantage." *Id.* at 702.

When Congress creates an agency with an express mission—in OSHA's case, to protect workers' health and safety—the agency officials will almost inevitably form views on the best means of carrying out that mission. The subjective partiality of an official of such an agency does not invalidate a proceeding that the agency conducts in good faith. *Lead Industries Ass'n, Inc. v. EPA*, —— F.2d ——, —— (D.C. Cir. No. 78-2201, decided June 27, 1980) (slip opinion at 99); *Carolina Environmental Study Group v. United States*, 510 F.2d 796, 801 (D.C. Cir. 1975).

This court has indeed required disqualification of an agency adjudicator when his public statements about pending cases revealed he " 'has in some measure adjudged the facts as well as the law of a particular case in advance of hearing it.' " *Cinderella Career & Finishing Schools, Inc. v. FTC*, 425 F.2d 583, 591 (D.C. Cir. 1970), *quoting Gilligan Will & Co. v. SEC*, 267 F.2d 461, 469 (2d Cir.), *cert. denied*, 361 U.S. 896 (1959);

see Texaco, Inc. v. FTC, 336 F.2d 754, 760 (D.C. Cir. 1964), *vacated and remanded per curiam on other grounds*, 381 U.S. 739 (1965). And, although these cases involved adjudication, we could perhaps logically apply them to hybrid rulemaking proceedings like the present one in which the factual predicates of final rules are subject to review under the substantial evidence test.

So applied, however, these cases would lead us to vacate the lead standard only if Dr. Bingham had demonstrably made up her mind about important and specific factual questions and was impervious to contrary evidence. This test would be hard enough for petitioners to meet. But in *Ass'n of Nat'l Advertisers, Inc. v. FTC*, *supra*, handed down after oral argument in the present case, we raised an even higher barrier to claims of bias in rulemaking proceedings. We stressed there the difference between the essentially "legislative" factfinding of a rulemaker and the trial-type factfinding of an adjudicator, and thus held that the *Cinderella* test was inappropriate. We concluded that an agency official must be disqualified from rulemaking "only when there has been a clear and convincing showing that [she] has an unalterably closed mind on matters critical to the disposition of the proceeding." —— F.2d at ——, slip opinion at 38.

The relevant statute in *Ass'n of Nat'l Advertisers, Inc. v. FTC*, *supra*, Section 18 of the Federal Trade Commission Act, 15 U.S.C. § 57a (1976), like the OSH Act, creates procedures more formal than the minimal ones required for informal rulemaking by 5 U.S.C. § 553 (1976). We held, however, that even in such hybrid rulemaking the findings of fact so intertwine with the policies that emerge from them that we could not, as we could in *Cinderella*, "cleave law from fact" in de-

ciding whether the official had prejudged factual issues. —— F.2d at ——, slip opinion at 33.[14]

Dr. Bingham's general expression of solidarity with the Steelworkers was legally harmless. Her call for support for congressional candidates sympathetic to her agency's mission did not bear on any specific issues in the case, and is probably the sort of political activity we simply must accept from a political appointee. Thus her bias, if any, shows up in her remarks about MRP, the dangers of lead poisoning, and the inflationary effect of the lead standard.

Had she made these remarks before the rulemaking began or while OSHA was receiving public comments, we might still have had to strain precedent to find grounds for disqualification. Her remarks on MRP do not bear on any specific factual issues, but rather reveal a general predisposition on a matter of policy, of the sort held legally harmless in *FTC v. Cement Institute, supra,* and *Ass'n of Nat'l Advertisers, Inc. v. FTC, supra.* Her remarks about endangered workers do bear on a factual question, but only very generally; they reveal no prejudgment on the precise and complex factual issues in the case, such as the exact blood-lead level at which disease

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[14] FTC Chairman Pertschuk had made public statements expressing his strong belief in the harm advertising caused small children and in the need for stringent rules to curb that harm. Our decision stated that in presenting legal and policy arguments for the rules Pertschuk "not unnaturally employed the factual assumptions that underlie the rationale for Commission action," but that his use of such assumptions "did not necessarily bind him to them forever." *Ass'n of Nat'l Advertisers, Inc. v. FTC,* —— F.2d ——, —— (D.C. Cir. No. 79-1117, decided Dec. 27, 1979) (slip op. at 43). We also noted that the very requirement that an agency issue a formal notice of proposed rulemaking assumes that the agency head will make tentative conclusions of fact to help focus the rulemaking comments. —— F.2d at ——, slip op. at 44-45.

develops. Finally, although the speech does allude specifically to the cost of the standard to the battery industry, Dr. Bingham's expression of disbelief in the inflationary effect of the standard is really part of a general rhetorical flourish about the danger of undervaluing worker health.

In any event, the fact remains that Dr. Bingham delivered the speech *after* she had decided on the standard and *after* the record had been closed. We can thus infer bias only if we construe her remarks retroactively. There may be cases warranting such judicial mind-reading, but they would have to involve far more explicit and detailed statements by the allegedly biased person. The only language of predisposition in Bingham's speech that we can plausibly read retroactively is that on MRP,[15] and her statement on that subject falls within the category of views derived from administrative experience to which the Supreme Court referred in *FTC v. Cement Institute, supra,* 333 U.S. at 702. Thus, Bingham's speech simply does not reveal prejudgment with sufficient specificity to prove bias under the *Cinderella*

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[15] Bingham had been chairperson of the advisory committee empaneled by the Secretary to aid him in setting a standard for coke ovens. In that role she voted for a medical removal provision, but the Secretary decided not to include the provision in the coke oven standard. Since that time Bingham has overseen the issuance of at least one OSHA standard—for arsenic—that contains no MRP provision. *See* 43 FED. REG. 19584 (1978). Though LIA notes that the record on the arsenic standard had been closed before Bingham assumed her new job, that standard does at least show that Bingham's views did not force OSHA into an unyielding posture. Similarly, though the cotton dust standard issued under Bingham's direction does provide for retaining wages for removed workers, 29 C.F.R. § 1910.1043(f)(2)(v) (1979), that provision, triggered by a worker's inability to wear a respirator, differs noticeably from the lead MRP, § 1910.1025(k), which depends on the measured blood-lead level in a worker's body.

standard, and, all the more so, does not constitute the "clear and convincing" evidence demanded by *Ass'n of Nat'l Advertisers, Inc. v. FTC, supra.* Judicial review of rulemaking, unlike the ABA Canon of Ethics, does not attack the mere appearance of impropriety. Bingham's speech, however unfortunate, does not prove the proceedings unfair.

B. *Improper Staff Role and Separation of Functions*

LIA aims its next procedural attack at OSHA staff attorneys who, LIA argues, acted essentially as advocates for a stringent lead standard by consulting with and persuading the Assistant Secretary as she drew her conclusions from the record. LIA would have us conclude that the agency decisionmaker engaged in *ex parte*, off-the-record contacts with one of the adverse sides in the rulemaking, thereby rendering the proceedings unfair. Grounding its contention somewhat equivocally on due process, the procedural principles inherent in hybrid rulemaking, and OSHA's own regulations providing for cross-examination, LIA asks us to invalidate the entire proceeding.

The key agency employee in question was Richard Gross, a lawyer in the Office of the Solicitor at OSHA, who served as a so-called "standard's attorney" throughout the rulemaking.[16] His precise role is as ambiguous as it is important. LIA portrays him as a sort of guard-

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[16] Another lawyer from the Office of the Solicitor, Donald Kuchenbecker, also served in this role during the hearing, but apparently did not join Gross in advising the Assistant Secretary during the setting of the final standard. LIA also points to a special consultant on MRP, Robert Jennings, who assisted Gross throughout the proceedings. *See* Appendix to Lodged Documents (ALD) 28-43. LIA apparently concedes that Jennings, though not the other OSHA consultants, *see* text and note at note 32 *infra*, was, in effect, a staff employee.

ian *ad litem* for a stringent lead standard who "horse-shed" expert witnesses to contrive a record that would support such a standard, LIA brief at 30, and then impermissibly advocated before the Assistant Secretary to make certain she construed the record as he intended. OSHA portrays him rather as a neutral party with no particular cause other than developing the fullest and soundest scientific and economic record possible, and with no bias other than the general orientation toward worker health inevitable in any OSHA employee.

The standard's attorney was at the center of activity throughout the rulemaking.[17] He worked with the regular OSHA staff in reviewing preliminary research and drafting the proposed standard, all the while offering informal legal advice. He helped organize the public hearings and, having immersed himself in the scientific literature and in the submitted public comments, he communicated regularly with the prospective expert witnesses. In these communications he briefed the witnesses on the issues they were to address in their testimony, explained the positions of the agency, the industry, and the unions on key questions, discussed the likely criticism of the experts' testimony, and asked the experts for any new information that supported or contradicted the OSHA proposal.[18] During the hearing itself he con-

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[17] The following summary of the role of the standard's attorney derives from the Affidavit of Grover C. Wrenn, Director of Health Standard Programs at OSHA. Supplemental Appendix (SA) 2237.

[18] The letters of Gross' colleague, Donald Kuchenbecker, to two of the expert medical witnesses best reveal the work of the standard's attorney. ALD 66-82. The letters are exhaustively detailed and generally quite neutral in briefing the witnesses on the important medical issues and urging them to supply all new relevant evidence, including any at odds with a stringent lead standard. Nevertheless, Kuchenbecker did make some imprudent remarks. He told Dr. Piomelli that it "would not be helpful to OSHA" if the latter

ducted all initial questioning of OSHA witnesses and cross-examined all other witnesses. After the hearings he assisted the Assistant Secretary by reviewing the evidence in the record, preparing summaries, analyses, and recommendations, and helping draft the Preamble to the final standard.

In a proceeding to create a general rule it makes little sense to speak of an agency employee advocating for one "side" over another. However contentious the proceeding, the concept of advocacy does not apply easily where the agency is not determining the specific rights of a specific party, and where the proposed rule undergoes detailed change in its journey toward a final rule. Indeed, as OSHA notes, the true adversaries here may well have been the industry and the unions, since the final standard, while in no sense a mathematical compromise, did fall between the old standard, to which the industry had resigned itself, and the extremely stringent one the unions urged, *see* Part VIII *infra*. Thus, the standard's attorney may have been an advocate for *some* new lead standard, and probably even a stringent one, but not necessarily for one specific standard supported by one specific party.

Nevertheless, the adversary tone and format of the proceedings are obvious. At the very least, the standard's attorney was committed to the general principles of the proposed standard, and so inevitably represented those

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were to state that there was no correlation between air-lead and blood-lead measurements, ALD 77, and told both Dr. Piomelli and Dr. Seppalainen that OSHA wanted to avoid the "ticklish issue" of how to accommodate female workers of child-bearing age if feasibility limits required OSHA to set a standard that threatened such women but not other workers. ALD 72, 74-75.

In context, these remarks do not overcome the generally objective import of the letters; moreover, Kuchenbecker himself did not advise the Assistant Secretary on the final standard, and we are loath to project his attitude onto Gross.

principles "against" the industry parties so obviously adverse to them. Moreover, by conducting the "direct examination" of OSHA witnesses and the cross-examination of all others, the standard's attorney certainly created the public impression of conventional legal advocacy. Thus OSHA's portrayal of his role, while logical, is a bit disingenuous. The Assistant Secretary might well have been able to assess the record more objectively—if less efficiently—had the standard's attorney not been constantly at her side. Therefore, although we have some doubt about calling the standard's attorney an "advocate" in the context of such rulemaking,[19] we will *assume* he played that role so we can measure his conduct against the legal constraints on the agency.[20]

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[19] We also have some doubt as to the wisdom of singling out a staff *lawyer* in this case, when other, nonlegal, staff people probably participated with great vigor both in developing the agency position during the hearings and in advising the Assistant Secretary in drafting the final standard. In the major case in this court to address the issue of staff influence, *Hercules, Inc. v. EPA*, 598 F.2d 91 (D.C. Cir. 1978), *see* text and note at note 29 *infra*, the agency decisionmaker admitted she had consulted with a wide range of staff employees after the record was closed. Nevertheless, in expressing concern about the propriety of staff influence there, we focused solely on the conduct of the staff attorneys, *id.* at 127, even though they were the only staff people consulted with whom the decisionmaker did *not* discuss factual or policy questions. Drawing a generic distinction between lawyers and nonlawyers in an informal rulemaking may be dubious practice. But we need not decide the matter here, because we hold that the standard's attorney's conduct did not impair the proceedings even if that conduct was generically different from his colleagues'.

[20] We assume, however, only that the standard's attorney may have influenced the Assistant Secretary by reinforcing, according to his bias, certain information and arguments that they were put in the record of the public proceedings. Thus this is not a case where agency employees supplied the decisionmaker with actual new evidence which the agency has identified as part of the basis of its decision, but which it

has refused to disclose except through a "blind reference." *See United States Lines, Inc. v. FMC*, 584 F.2d 519, 533-536 (D.C. Cir. 1978). The distinction is important, since we were referring only to the latter situation when we stated, in the course of restricting *ex parte* contacts, in *Home Box Office, Inc. v. FCC*, 567 F.2d 9, 55 (D.C. Cir.) (*per curiam*), *cert. denied*, 434 U.S. 829 (1977): "From a functional standpoint, we see no difference between assertions of fact and expert opinion tendered by the public * * *and that generated internally in an agency * * *."

In the absence of proof by LIA that the staff did supply the decisionmaker with new hard data off the record, our assumption that the staff lawyer was an advocate does not mean that he was anything other than a *staff* advocate. That is, even if he were predisposed on the lead standard, the standard's attorney's conduct remained within the general boundaries of the *deliberative* process and, however biased, his communications with the Assistant Secretary remained within the boundaries of *deliberative* material. Thus, any errors in the Assistant Secretary's determinations attributable to the staff lawyer's predisposition remain within the liberal notion of the deliberative process we described in the context of the intra-agency communication exemption to the Freedom of Information Act:

> It is possible that the assistants in winnowing down the record may have made errors of inclusion or exclusion, or even gross distortions of fact. But these possibilities reflect human errors and misjudgments which are part of the deliberative process. The fact that errors may creep in and mislead the final decision-maker merely suggests that there may be errors in the deliberative or adjudicatory process; it does not mean that the preliminary studies by the staff are separate from the adjudicatory process or should be classified as part of the public record. The work of the assistants in separating the wheat from the chaff is surely just as much part of the deliberative process as is the later milling by running the grist through the mind of the administrator. And that some wheat is thrown away and some chaff included with the grain does not alter the nature of the process, even though it reflects error on the part of the assistants.

Montrose Chemical Corp. v. Train, 491 F.2d 63, 71 (D.C. Cir. 1974). It will be important to keep this notion of the deliberative process in mind when we examine below the similarity of outside consultants to agency staff.

We note at the outset that nothing in the Administrative Procedure Act bars a staff advocate from advising the decisionmaker in setting a final rule. The APA deals with *ex parte* contacts in two provisions. 5 U.S.C. § 554(d) (1976), which applies solely to adjudications, prohibits any off-the-record communication between an agency decisionmaker and *any* other person about a fact in issue, and in particular bars any prosecuting or investigating employee of the agency from participating in final decisions. Since an OSHA proceeding to set a safety and health standard is obviously rulemaking, and not adjudication, *Industrial Union Dep't, AFL-CIO v. Hodgson, supra,* 499 F.2d at 472-473; *see* 5 U.S.C. § 551 (4) (1976), that provision cannot apply here. *See Ass'n of Nat'l Advertisers, Inc. v. FTC, supra; Hercules, Inc. v. EPA, supra,* 598 F.2d at 125 (citing legislative history of APA).[21] 5 U.S.C. § 557(d) (1976), which applies

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[21] The ATTORNEY GENERAL'S MANUAL ON THE ADMINISTRATIVE PROCEDURE ACT (1947), which is helpful in construing the APA because the Justice Department helped to draft the statute, *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc., supra* note 6, 435 U.S. at 546 & n.19, notes:

> Not only were the draftsmen and proponents of the bill aware of this realistic distinction between rule making and adjudication, but they shaped the entire Act around it. Even in formal rule making proceedings * * * the Act leaves the hearing officer entirely free to consult with any other member of the agency's staff. In fact, the intermediate decision may be made by the agency itself or by a responsible officer other than the hearing officer. This reflects the fact that the purpose of the rule making proceeding is to determine policy. Policy is not made in Federal agencies by individual hearing examiners; rather it is formulated by the agency heads relying heavily upon the expert staffs which have been hired for that purpose. And so the Act recognizes that in rule making the intermediate decisions will be more useful to the parties in advising them of the real issues in the case if such de-

to formal rulemaking as well as adjudication, prohibits *ex parte* communications relevant to the merits of a proceeding between the agency and *interested parties outside the agency*. Even were we to ignore our own determination and Congress' that the OSH Act creates essentially informal rulemaking, *Industrial Union Dep't, AFL-CIO v. Hodgson, supra*, 499 F.2d at 472-473; *Legislative History of the Occupational Safety and Health Act of 1970*, 92d Cong., 1st Sess. 1187, 1201 (Committee Print) (June 1971) (hereinafter *Legislative History*), this provision cannot apply to *ex parte* contacts wholly among agency employees. *Hercules, Inc. v. EPA, supra*, 598 F.2d at 125 n.60 (citing legislative history of § 557 (d)).

Moreover, in establishing the special hybrid procedures in the OSH Act, Congress never intended to impose the separation-of-functions requirement it imposes in adjudications. The legislative history shows that Congress consistently turned back efforts to impose such formal procedures on OSHA standard-setting.[22] Adding to informal rulemaking the special requirement of a substantial evidence test does not change the essential character of the

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cisions reflect the views of the agency heads or of their responsible officers who assist them in determining policy. * * *

ATTORNEY GENERAL'S MANUAL at 15.

[22] The House-reported bill would have imposed on OSHA a quasi-adjudicatory scheme for setting standards, including a special five-member standard-setting board, *Legislative History of the Occupational Safety and Health Act of 1970*, 92d Cong., 1st Sess. 1095-1096 (Comm. Print) (June 1971) (hereinafter *Legis. Hist.*), which was intended to ensure separation of functions within the agency. *Id.* at 148. Congress rejected the scheme, intending instead that "professional and technical expertise * * * involved in the development and promulgation of a standard * * * would be fully available to the Secretary, both as members of his staff, and as members of advisory committees." *Id.*

rulemaking, *Ass'n of Nat'l Advertisers, Inc. v. FTC*, *supra*, —— F.2d at ——, slip opinion at 18,[23] especially under a statute like the OSH Act which does not even require a hearing before the agency sets a standard, *see* 29 U.S.C. § 655(b)(3) (1976).[24]

Thus we can discern no statutory basis in either the APA or the OSH Act for a separation-of-functions requirement in OSHA rulemaking. And under the Supreme Court's decision in *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, *supra*, that is virtually the end of the inquiry. Unless we find that the standard's attorney here violated the

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[23] Indeed, an "emerging consensus" of the Courts of Appeals cautions us not to exaggerate the difference between "substantial evidence" and "arbitrary and capricious" review even with regard to agency factfinding, the element of informal rulemaking to which these formulas directly apply. *Pacific Legal Foundation v. Dep't of Transportation*, 593 F.2d 1338, 1343 n.35 (D.C. Cir.), *cert. denied*, —— U.S. ——, 48 U.S. L. WEEK 3218 (Oct. 1, 1979).

[24] As Judge Leventhal put it in *American Airlines, Inc. v. CAB*, 359 F.2d 624, 629 (D.C. Cir.), *cert. denied*, 385 U.S. 843 (1966):

> [R]ule making is a vital part of the administrative process, particlularly adapted to and needful for sound evolution of policy * * *, [and] is not to be shackled, in the absence of clear and specific Congressional requirement, by importation of formalities developed for the adjudicatory process and basically unsuited for policy rule making.

See United States v. Florida East Coast R. Co., 410 U.S. 224, 240-241 (1973); *United States v. Allegheny-Ludlum Steel Corp.*, 406 U.S. 742, 757-758 (1972); Wright, *Court of Appeals Review of Federal Regulatory Agency Rulemaking*, 26 ADMIN. L. REV. 199, 206-207 (1974).

Of course, the mere fact that this particular proceeding became highly adversarial cannot transform informal rulemaking into something else. *See Hoffman-LaRoche, Inc. v. Kleindienst*, 478 F.2d 1, 13 (3d Cir. 1973).

due process rights of the petitioners, 435 U.S. at 543, or that this is one of those "extremely compelling circumstances" in which courts remain free to impose non-constitutional extra-statutory procedures on agencies, *id.*, we must reject LIA's challenge here.[25]

In recent cases we have in fact gone beyond the strict terms of the APA and the substantive agency statute to impose a ban on *ex parte* contacts. In *Home Box Office, Inc. v. FCC*, 567 F.2d 9, 51-59 (D.C. Cir.) (*per curiam*), *cert. denied*, 434 U.S. 829 (1977), we held that off-the-record communications between members of the agency and interested outside parties violated the due process rights of parties not privy to the communications. In *United States Lines, Inc. v. FMC*, 584 F.2d 519, 536-543 (D.C. Cir. 1978), decided after *Vermont*

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[25] We note that LIA's attempt to infer a ban on *ex parte* staff contacts from OSHA's own regulations impermissibly strains the language and import of those regulations. The agency has carried out its mandate to combine informal rulemaking with the substantial evidence test by ruling that "fairness may require an opportunity for cross-examination on crucial issues" and providing:

> The presiding officer is empowered to permit cross-examination under such circumstances. The essential intent is to provide an opportunity for effective oral presentation by interested persons which can be carried out with expedition and in the absence of rigid procedures which might unduly impede or protract the rulemaking process.

29 C.F.R. § 1911.15(a)(3) (1979). This very general accommodation of the need for some sort of oral presentation in no way implies such an unusual rule as a ban on staff influence over agency decisions, especially where there is no proof that the standard's attorney provided the Assistant Secretary with any hard data that escaped cross-examination. *Cf. Ass'n of Nat'l Advertisers, Inc. v. FTC*, *supra* note 14, —— F.2d at ——, slip op. at 18 (statutory provision of limited right of cross-examination does not convert informal rulemaking into adjudication).

Yankee, we reaffirmed the principle of *Home Box Office*, finding the ban on *ex parte* contacts there inherent in the statutory requirements of a hearing[26] and judicial review under the arbitrary and capricious standard. *See Nat'l Small Shipments Traffic Conference, Inc. v. ICC*, 590 F.2d 345, 351 (D.C. Cir. 1978). But neither of these cases involved improper influence of staff on agency decisionmakers,[27] nor does the reasoning of either case lead us to apply the ban on *ex parte* contacts to agency staff.

In *Home Box Office*, of course, we expressed our general concern that whenever the record fails to disclose important communications that may have influenced the agency decisionmaker, the court cannot fully exercise its power of review. *Home Box Office, Inc. v. FCC*, *supra*, 567 F.2d at 54. But we spoke there in the context of massive evidence that industry parties financially interested in the rulemaking secretly lobbied with FCC staff and commissioners. We stated:

> [T]he evidence is certainly consistent with often-voiced claims of undue industry influence over Commission proceedings, and we are particularly concerned that the final shaping of the rules we are reviewing here may have been by compromise among the contending industry forces, rather than by exercise of the independent discretion in the public inter-

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[26] Thus, one reason that *United States Lines, Inc. v. FMC*, *supra* note 20, is inapposite is that the OSH Act, unlike the statute there, does not make a hearing a *sine qua non* of standard-setting, but requires a hearing only when a party requests one upon filing an objection to a proposed rule. 29 U.S.C. § 655(b)(3) (1976).

[27] In *United States Lines, Inc. v. FMC*, *supra* note 20, agency staff served as a conduit between the agency and the interested outside parties, 584 F.2d at 537-538, but the court's real concern obviously lay with the improper influence of the outsiders.

> est the Communications Act vests in individual commissoners. * * *

Id. at 53. Influence from within an agency poses no such threat. Moreover, in summarizing our guidance for the agencies in *Home Box Office* we identified the type of communication we were restricting specifically as that between the agency and "any interested private party, or an attorney or agent for any such party[.]" *Id.* at 57. In *United States Lines*, where the agency abruptly reversed its decision on the antitrust exemption of a shipping agreement after it heard *ex parte* legal arguments from private parties, we stated that "adversarial comment is particularly critical where, as here, *ex parte* communications are made by a party interested in securing the Commission approval necessary for the legality of its contracts[.]" *United States Lines, Inc. v. FMC*, *supra*, 584 F.2d at 542.

Neither the constitutional[28] nor the implicit statutory principles that decided these cases apply with any force to the type of staff influence LIA challenges here. Moreover, an OSHA rulemaking proceeding is of a character wholly distinct from that of a proceeding which resolves "conflicting private claims to a valuable privilege," *Sangamon Valley Television Corp. v. United States*, 269 F.2d 221, 224 (D.C. Cir. 1959), *quoted in Home Box Office, Inc. v. FCC*, *supra*, 567 F.2d at 55, and from a "quasi-adjudicatory" proceeding in which we found the potential for bias as great as that in a case of competing claims, *United States Lines, Inc. v. FMC*, *supra*, 584 F.2d at 539, 542.

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[28] The Supreme Court has held that due process does not require separation between investigation and adjudication in an agency proceeding. *Withrow v. Larkin*, 421 U.S. 35, 47-52 (1974). As a *general* rule, due process probably imposes no constraints on informal rulemaking beyond those imposed by statute. *See Willapoint Oysters, Inc. v. Ewing*, 174 F.2d 676, 694 (9th Cir. 1949). Thus we are very wary of extending the due process reasoning of *Home Box Office*.

In only one recent case have we actually addressed the propriety of *ex parte* contacts between agency decisionmakers and agency staff, but even there our discussion of the issue only was dictum, and indeed essentially supports OSHA here. In *Hercules, Inc. v. EPA*, *supra*, we dealt with a claim that the chief judicial officer of the Environmental Protection Agency, who assisted the Administrator in setting final regulations on two toxic substances, consulted after the record was closed with staff experts, including two staff lawyers who had represented the staff position at the administrative hearing. 598 F.2d at 121-122. We noted that the problem was one "of great sensitivity," *id.* at 126, which caused us some "uneasiness," *id.* at 127, and on which we suggested we might rule when a more concrete case than the one there presented itself, *id.* at 126.

To be sure, most of the special factors we cited in avoiding ruling on the issue in *Hercules, Inc.* are absent here.[29] Nevertheless, LIA's reading of *Hercules, Inc.* ig-

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[29] The judicial officer in *Hercules, Inc. v. EPA*, *supra* note 19, only consulted the staff attorneys on the location of documents in the record; she did not discuss facts and policy with them. 598 F.2d at 121-122. The proceeding in that case was complete before we handed down *Home Box Office*, so we followed *Action for Children's Television, Inc. v. FCC*, 564 F.2d 458, 474 (D.C. Cir. 1977), in refusing to apply *Home Box Office* retroactively. *Hercules, Inc. v. EPA*, *supra*, 598 F.2d at 126. These two factors obviously distinguish *Hercules, Inc.* from the present case. Of a third factor, however, we are less sure. We noted in *Hercules, Inc.* that Congress had created, and the courts had reinforced, severe and rigid timetables for rulemaking on toxic substances, so the agency needed all the help it could get in the face of the massive record there to comply with the law. *Id.* Although OSHA is not under the same specific restraints, its proceedings, like EPA's, involve records of "extraordinary bulk and complexity," *id.*, and its mandate, like EPA's, invokes "the rule of ancient origin that expedition in protecting the public health justifies less elaborate procedure than may be required in other contexts." *Id.* (citing cases).

nores the almost unmistakable conclusion we drew there: that the issue was one for Congress or the agencies to resolve. Recognizing, however euphemistically, that *Vermont Yankee* "counsels restraint" in imposing nonstatutory procedural requirements on agencies, *id.* at 126, we reviewed the legislative history of the APA on the staff contacts issue. We discovered there a clear congressional intent not to impose any separation-of-functions requirement unless agencies begin to abuse the practice, in which case "[a]mendatory or supplementary legislation can supply any deficiency." 92 CONG. REC. 2159 (1946) (remarks of Senator McCarran), *quoted in Hercules, Inc. v. EPA, supra*, 598 F.2d at 127. We ended our discussion of the issue by asserting:

> Now might be a particularly propitious time for Congress or the agencies to limit or provide disclosure of post-hearing contacts between staff advocates and decisionmakers. * * *

Id. at 127-128. The invitation to Congress and the agencies may remain, but so do the limits of the judicial task.

Rulemaking is essentially an institutional, not an individual, process, and it is not vulnerable to communication within an agency in the same sense as it is to communication from without. In an enormously complex proceeding like an OSHA standard setting, it may simply be unrealistic to expect an official facing a massive, almost inchoate, record to isolate herself from the people with whom she worked in generating the record. *See Braniff Airways, Inc. v. CAB*, 379 F.2d 453, 461 (D.C. Cir. 1967). In any event, we rest our decision not on our own theory of agency management, but on the state of the law.

C. *Improper Use of Consultants*

LIA makes two attacks on OSHA's reliance on out-of-house consultants in developing the lead standard.

The first attack goes to the *general* use of consultants and the effect thereof on the Assistant Secretary's exercise of her duty to determine the final standard. LIA contends that the Assistant Secretary hired so many consultants and relied on them so heavily for so many tasks that she essentially abdicated her responsibility for setting the lead standard to outsiders. OSHA itself admits that it lacked sufficient staff expertise to deal with all the important issues without outside help,[30] thus perhaps earning LIA's ironic observation that the agency requests deference to its expertise while pleading it does not have enough of that commodity. But the question is whether the use of consultants here violated the law.

The record shows that OSHA did make rather broad requests for help from the consultants. As we discuss below, OSHA relied heavily on David Burton Associates (DBA) and Nicholas Ashford and his Center for Policy Alternatives (CPA) in examining the data on feasibiilty and developing a "technology-forcing" rationale for the standard. The agency hired a number of other expert consultants, giving them fairly broad mandates to summarize and evaluate data in the record, prepare record data for computer processing, and help draft portions of the Preamble and the final standard. *E.g.*, ALD 39-40, 51-60, 65. LIA argues that such reliance on outsiders invites abuse, even if one assumes the honesty of the ones in this case, since hired hands have a financial incentive to tell the agency what it wants to hear, and have no civil service protection against retaliation for telling uncomfortable truths.

LIA asserts that no case has considered and upheld the legality of such reliance. But neither can LIA locate a case or statute forbidding such a practice, and once again we are restrained by *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc., supra,*

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[30] Affidavit of Grover C. Wrenn, SA 2240-2241.

in imposing procedural rules on the agencies. If anything, the law generally bearing on the issue supports OSHA here. The OSH Act empowers the agency to employ expert consultants, 29 U.S.C. § 656(c) (1976), and OSHA might have possessed that power even without express statutory authority, *see Tabor v. Joint Board for Enrollment of Actuaries*, 566 F.2d 705, 708 n.5 (D.C. Cir. 1977). Moreover, we have even treated the use of consultants as proof that the agency has taken its responsibilities seriously. *Weyerhauser Co. v. Costle*, 590 F.2d 1011, 1026 (D.C. Cir. 1978).[31]

LIA's position thus comes down to the challenge that OSHA has violated the principle of *Morgan v. United States*, 298 U.S. 468, 480-481 (1936) (*Morgan I*): "The one who decides must hear," and an agency denies the parties a true hearing if the official who acts for the agency has not personally confronted the evidence and the arguments. *See Braniff Airways, Inc. v. CAB, supra*, 379 F.2d at 461. Though *Morgan I* expressly allowed agency officials to rely on their subordinates in reviewing the record, 298 U.S. at 481, it did not, of course, address the question of outside consultants. Nevertheless, applying the general principle of *Morgan I*, we see that LIA cannot buttress its general allegation of excessive reliance with any specific proof that the Assistant Secretary failed to personally confront the essential evidence and arguments in setting the final standard. Without at this point addressing the substantive validity of the lead standard, we note that in the lengthy Preamble and Attachments to the final standard the decisionmaker reviewed the evidence and explained the evidentiary bases

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[31] "Where existing methodology or research in a new area of regulation is deficient, the agency necessarily enjoys broad discretion to attempt to formulate a solution to the best of its ability on the basis of available information." *Industrial Union Dep't, AFL-CIO v. Hodgson*, 499 F.2d 467, 474-475 n.18 (D.C. Cir. 1974).

for each part of the standard. Moreover, the Assistant Secretary demonstrated her independence from the consultants by strongly criticizing some of their conclusions on the key issue of feasibility. *E.g.*, 52984/1.

To inquire further would be to probe impermissibly into the mental processes by which the Assistant Secretary made her decision. *See United States v. Morgan, supra*, 313 U.S. at 422; *Washington Research Project, Inc. v. Dep't of HEW*, 504 F.2d 238, 248 (D.C. Cir. 1974), *cert. denied*, 421 U.S. 963 (1975). The unsupported allegation that hired consultants might have an incentive to act dishonestly cannot overcome the presumption that agency officials and those who assist them have acted properly. *See Willapoint Oysters, Inc. v. Ewing*, 174 F.2d 676, 696 (9th Cir. 1949). Thus we generally see no reason to force agencies to hire enormous regular staffs versed in all conceivable technological issues, rather than use their appropriations to hire specific consultants for specific problems.

LIA's second attack goes to *specific* uses of consultants, and alleges damage to the state of the rulemaking record, rather than to the Assistant Secretary's fulfillment of her personal responsibility. After closing the record, OSHA sought help from outside consultants in reviewing the record and preparing the Preamble. Two consultants were primary. The agency asked David Burton and DBA to help review the record to determine the feasibility of a permissible air-lead standard of 50 ug/m^3, as opposed to the 100 ug/m^3 standard the agency had proposed in the original notice of rulemaking, and on which most of the public commentary had focused. And OSHA asked Nicholas Ashford and CPA to analyze, in light of the record, the possibility of marking a correlation between air-lead levels and blood-lead levels. Both these consultants had previously aided OSHA by supplying on-the-record reports and testifying as expert witnesses at

the public hearings.[32] Both fulfilled the new requests by submitting written reports, of 117 and 192 pages respectively, neither of which the agency has released or placed in the rulemaking record. LIA contends that the reports are illegal *ex parte* communications which, like the communications with the staff advocates described earlier, constitute "secret briefs" and off-the-record evidence which LIA was deprived of a chance to rebut and the court a chance to review.

We note first that, as in the case of the staff-influence charge discussed earlier, LIA has not identified any hard data or new legal arguments which are contained only in the allegedly improper *ex parte* communications and on which OSHA demonstrably relied in setting the standard. *See Seacoast Anti-Pollution League v. Costle*, 572 F.2d 872, 881 (1st Cir. 1978), *cert. denied*, 439 U.S. 824 (1979). Thus LIA has not shown that OSHA has materially prejudiced parties who were not privy to the communications. *See id.; compare Doe v. Hampton*, 566 F.2d 265, 276-278 (D.C. Cir. 1977) (*ex parte* introduction of substantive medical evidence that went beyond merely assisting decisionmaker in evaluating record might violate statute and agency rules, but harmless error where evidence merely cumulative). Rather, LIA asks us to infer that there must have been such *ex parte* evidence or legal argument, its request essentially relying on three factors: (1) The consultants were not agency employees; (2) they had previously testified as expert witnesses and prepared on-the-record reports; and (3) the documents we have before us, which describe the agreements and

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[32] Burton's earlier report had concerned the economic and technological feasibility of the proposed PEL of 100 ug/m^3. Ashford had first been retained to study the economic feasibility of the medical removal provision, but also submitted a preliminary report on the correlation between blood-lead and air-lead. Both Burton and Ashford testified at length during the public hearings.

expectations between OSHA and the consultants and the content of the undisclosed reports, imply that actual new evidence was requested and supplied. We find the first two factors legally irrelevant, or at least insufficient to prove impropriety. As for the third, as we demonstrate below, we simply reject LIA's construction of the documents.

Were we to construe these factors otherwise, we might face the difficult task of resolving the scope of the *ex parte* contacts doctrine as generated by *Home Box Office, Inc. v. FCC, supra*, and developed by *United States Lines, Inc. v. FMC, supra*: Does the doctrine apply to a rulemaking proceeding leading to a truly general regulation, as opposed to a proceeding resolving "conflicting private claims to a valuable privilege" like that in *Home Box Office* or quasi-adjudication like *United States Lines*? [33] But we need not address that question here, because the documents show that the communications between the agency and the consultants were simply part of the deliberative process of drawing conclusions from the public record. The consultants acted after the record was closed as the functional equivalent of agency staff, so the question of the legal propriety of OSHA's reliance on DBA and CPA is foreclosed by our earlier conclusion that

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[33] LIA contends that because the lead standard threatened enormous costs for the industries and a windfall to employees through the medical removal provision, the rulemaking remains subject to the *ex parte* contact doctrine even under the narrower formulations in Judge MacKinnon's special concurring opinion in *Home Box Office, Inc. v. FCC, supra* note 20, 567 F.2d at 61, and in *Action for Children's Television, Inc. v. FCC, supra* note 29, 564 F.2d at 477. But virtually any important new regulation will be expensive for some parties and economically beneficial to others, and we do not think the limiting principles suggested in these cases can sensibly apply to a general rulemaking where distinct parties are not seeking or competing for specific legal privileges of great monetary value.

neither the APA nor the *Home Box Office* doctrine imposes a separation-of-functions requirement on the agencies. Thus, even though we readily assume that OSHA used the consultants' reports—and even incorporated parts of them verbatim in the Preamble—LIA has suffered no legal prejudice from such use.

Despite some suspicious phrases singled out by LIA, a few examples from the documents reveal that the consultants' task was to help in the deliberative process. The contract between OSHA and DBA happens to include the remark: "It is understood by OSHA and DBA that the information necessary to provide satisfactory 'answers' may not be found in the hearing record." ALD 23. But the immediately preceding line states that "[a]nswers to these suggestions must be derived exclusively from the hearing record," and the agreement clearly describes DBA's task as one of analyzing, not providing, evidence. ALD 22-23. The language underscored by LIA is nothing more than a realistic warning that there are no absolutely clear answers to some of the speculative questions about the lead standard. Similarly, the remark in a Task Order to DBA that "[r]eferences supplied that are not in the record are for your own information only and should not be used as documentation for any conclusions," ALD 101, read carefully, actually supports OSHA here—all the more so in context.[34] Finally, in a released segment of its actual post-hearing report DBA states unmistakably, "Where sufficient information is not available in the rec-

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[34] "Determine what conclusions the reulemaking [*sic*] record will support on the following questions and indicate the relative weight of the evidence supporting these conclusions." ALD 100. This instruction is also the context for another actually harmless sentence seized on by LIA: "*Do Not* rely only on explicit commentary, but make all possible and reasonable inferences the evidence will allow." *Id.* (emphasis in original).

ord from which to draw conclusions, no analysis is presented." ALD 108.[35]

The OSHA contract with CPA and Ashford may seem to give the consultant a broad mandate—"to conduct additional research and prepare material supplementary to the above testimony regarding medical removal protection [and a] post-hearing comment in response to a number of animal studies cited during the hearings to support a view contrary to OSHA's application of the Bernard model to predict blood lead levels." ALD 11.[36] At other points the contract asks CPA to "address the criticisms and defense" of the theoretical models on which OSHA sought to rely for its air-lead standards. ALD 12. Again, these requests to CPA must be read in the context of its assignment to summarize record evidence, to evaluate studies to probe them for flaws in method, and generally to marshal and interpret the data. ALD 147-152 (*Vaughn* index to CPA report). The phrases "additional research" and "material supplementary" add nothing to the clear instructions to CPA to offer opinions about and analyses of record evidence. That CPA was to respond off-the-record to on-the-record criticism of its own earlier report

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[35] The *Vaughn* index, *Vaughn v. Rosen*, 484 F.2d 820 (D.C. Cir. 1973), to the DBA report submitted in the Freedom of Information Act litigation over the consultants' reports, *see Lead Industries Ass'n, Inc. v. OSHA*, 610 F.2d 70 (2d Cir. 1979), reveals that OSHA continually expected DBA to "marshal" and "comment on" the evidence in the record, but never to supply new evidence. ALD 88-97. LIA points to a section heading entitled "Impact on Cost by Use of an Expanded Definition of Technical Feasibility," ALD 91, but the language is too general to suggest that DBA proffered a new legal argument. The phrase "expanded definition" may mean nothing more than a new analytic perspective on the evidence.

[36] OSHA now contends that the "post-hearing comment" referred to is actually a part of the record, in the form of a letter to OSHA at SA 2235A.

and testimony means nothing more than that its own earlier on-the-record testimony and comment were part of the larger rulemaking record it was now to review.

When performed by agency *staff*, this sort of sophisticated review of evidence has always been recognized as legitimate participation in the deliberative process. *Morgan I*, *supra*, 298 U.S. at 481-482; *Montrose Chemical Corp. v. Train*, 491 F.2d 63, 69-71 (D.C. Cir. 1974); *Braniff Airways, Inc. v. CAB*, *supra*, 379 F.2d at 461. And the circuit courts, in applying the intra-agency exemption to the Freedom of Information Act, 5 U.S.C. § 552(b)(5) (1976), have recognized that where outside consultants so engage in the deliberative process there is no *functional* difference between staff and consultants, and so there should be no *legal* difference. Thus, in *Soucie v. David*, 448 F.2d 1067, 1078 n.44 (D.C. Cir. 1971), we asserted that hired consultants, just like regular staff, need assured confidentiality so they can advise agency officials frankly. The *Soucie* holding was adopted in *Wu v. Nat'l Endowment for Humanities*, 460 F.2d 1030, 1032-1033 (5th Cir. 1972), *cert. denied*, 410 U.S. 926 (1973), where the court also noted, as we do here, that the agency had been specifically empowered by statute to hire consultants.

Recognizing that the principle of Exemption 5 of the FOIA bears generally on the question of post-hearing contacts with consultants, we find ourselves fortunate in having before us Judge Friendly's recent reports at issue in this case. After petitioning for review of this rulemaking, LIA went to federal court in New York to seek disclosure of various consultants' reports under the FOIA. In *Lead Industries Ass'n, Inc. v. OSHA*, 610 F.2d 70 (2d Cir. 1979), Judge Friendly examined the same affidavits, agreements, and indices that we have examined, and concluded that both the DBA report and the CPA report contributed to the process by which the Assistant Secre-

tary made her final decision. He conceded that the reports might contain some factual matter, but asserted that in a vast rulemaking like this one such information was necessarily incident to and not severable from the process of summary and analysis. *Id.* at 83. He suggested, moreover, that to the extent the reports drew inferences from and weighed the evidence they were more truly "deliberative" and thus better candidates for exemption than mere summaries of the record. *Id.*

Finally, responding to LIA's argument that CPA's off-the-record response to criticisms of its earlier report and testimony was improper, Judge Friendly found that the response contained no new evidentiary material, and that "the answers are of the same sort that could have been made by a knowledgeable member of OSHA's staff defending his expert witness' credibility before the decisionmaker." *Id.* at 84. Thus, the earlier participation of these consultants as expert witnesses in no way disqualifies them as aides in the final decision. Indeed, their participation is even less suspect than that of the staff advocates we discussed earlier, since any predisposition they held was a result of their factual research and not, as in the case of staff, an incident of serving as legal advocates for an institutional position. Once again, we sense no serious danger "that the final shaping of the rules we are reviewing here may have been by compromise among the contending industry forces, rather than by exercise of the independent discretion in the public interest" of agency officials. *Home Box Office, Inc. v. FCC, supra,* 567 F.2d at 53.[37]

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[37] We must underscore the two factors that undermine LIA's challenge on the facts of this case: The agency's alleged improper contacts were with outside parties who (1) had no direct financial stake in the outcome of the rulemaking and (2) aided in the deliberative process but did not offer new hard evidence. Thus we need not decide if the result would change if the first factor changed—if outside parties

We note finally that, at least with respect to DBA's post-hearing report on feasibility, OSHA's reliance on consultants at the deliberative stage of the rulemaking did cause problems in the record. Thus we share LIA's concern that the post-hearing contract with DBA was OSHA's first attempt to obtain expert advice directly addressing the feasibility of the 50 ug/m^3 standard. However, since the consulting contract only requested analysis of established record evidence, we prefer to consider any resulting deficiencies in the record as part of our review for substantial evidence to support OSHA's findings on feasibility, rather than under the *ex parte* contacts doctrine.

D. *Notice of Rulemaking*

The industry's most serious procedural attack on the lead standard goes to the sufficiency of the original notice of proposed rulemaking. The notice issue illustrates as well as any other that the rulemaking to set the lead standard was something less than a masterpiece of administrative procedure. Our task, however, is only to see whether the agency has complied with the law, and though the notice of rulemaking could well have been clearer and more specific, it meets the demands of that ubiquitous term of art in administrative law—"adequacy."

The OSH Act itself simply requires the Secretary to publish a proposed rule in the Federal Register, 29 U.S.C. § 655(b)(2) (1976), but implicitly incorporates the general requirement for informal rulemaking in 5 U.S.C. § 553(b)(3) (1976): notice of "the terms or substance of the proposed rule or a description of the subjects and issues involved." The agency must "fairly apprise inter-

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who were financially interested in the outcome communicated *ex parte* with the agency in the purported role of aides to the deliberative process.

ested persons" of the nature of the rulemaking, *American Iron & Steel Institute v. EPA*, 568 F.2d 284, 293 (3d Cir. 1977), but a final rule may properly differ from a proposed rule—and indeed must so differ—when the record evidence warrants the change. "A contrary rule would lead to the absurdity that in rule-making under the APA the agency can learn from the comments on its proposals only at the peril of starting a new procedural round of commentary." *International Harvester Co. v. Ruckelshaus*, 478 F.2d 615, 632 n.51 (D.C. Cir. 1973). Where the change between proposed and final rule is important, the question for the court is whether the final rule is a "logical outgrowth" of the rulemaking proceeding. *South Terminal Corp. v. EPA*, 504 F.2d 646, 659 (1st Cir. 1974). The courts have described the notice requirement with other verbal formulas, but general principles only take us so far. We must proceed to compare carefully the specific language of the proposal with that of the final rule, in light of the evidence adduced at the hearings.

LIA and other industry parties stress two serious—and related—differences between the proposed and final lead standard: (1) The proposal set a PEL of 100 ug/m^3 while the final standard's PEL is 50 ug/m^3. (2) The proposal apparently allowed industry to meet the PEL by relying on respirators whenever engineering and work practice controls proved infeasible, while the final standard strictly requires industry, after interim phase-in periods, to meet the PEL without relying on respirators at all.

1. *Notice of the PEL.* The difference between a PEL of 100 ug/m^3 and one of 50 ug/m^3 is obviously substantial. Though OSHA finds the latter PEL feasible, it cannot deny that the change in the final rule greatly increases the number of employees affected by the standard, as well as the standard's economic and technological

demands on industry. Nevertheless, the published explanation accompanying the proposed rule does in fact give notice that OSHA might set a PEL lower than 100 ug/m³.

OSHA first listed the major issues raised by the rulemaking, including:

> 1. Whether the proposed permissible exposure limit to lead should be 100 ug/m³: and whether this level incorporates an appropriate margin of safety;
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> 2. Whether subclinical effects of exposure should be considered in establishing a standard for occupational exposure to * * * lead;
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> * * * *
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> 8. To what extent are there groups with increased susceptibility to lead in the working population, such as women of childbearing age; and should such increased susceptibility, if it exists, be considered in establishing a standard for occupational exposure to * * * lead[.]

40 FED. REG. 45934/1-2 (1975). The question of "appropriate margin of safety" raised the possibility that OSHA might find the 100 ug/m³ PEL not safe enough. The issue of subclinical effects, in the context of the published proposal as a whole, also portended a lower PEL. There is scientific consensus that people rarely suffer actual clinical symptoms of lead intoxication at blood-lead levels below 80 micrograms of lead per 100 grams of whole blood (80 ug/100g), *id.* at 45935/2, which would probably correlate with air-lead levels over 100 ug/m³.[38] Nevertheless, OSHA noted that there were studies showing such subclinical effects of lead as inhibition of the important enzyme ALA at a blood level of 40 ug/100g, *id.* at 45936/1, which might correlate with an air level as low as 50 ug/m³. The proposal noted, in

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[38] The question of the true relationship between blood-lead and air-lead levels was a major debate in the rulemaking. *See* Part V-D *infra.*

fact, that "it is not known with certainty at what level this enzyme inhibition becomes clinically important," *id.* at 45935/1, and, most important, clearly stated:

> In any event, the question of both clinical and subclinical effects should be fully discussed in comments submitted as well as at the hearing, if one is held, *and might necessitate a different permissible exposure limit in the final standard than that proposed.*

Id. (emphasis added).[39]

Finally, notice of the issue of the special susceptibility of women of child-bearing age also should have alerted the parties that OSHA might lower the proposed PEL. The proposal noted there was evidence that fetuses and children, as well as people already suffering such conditions as anemia or renal insufficiency, needed their blood-lead levels kept as low as 30 ug/100g, and plainly stated that OSHA believed its statutory mandate re-

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[39] Moreover, in summarizing studies on the correlation between blood-lead and air-lead levels, OSHA's proposal concluded:

> [I]t appears that to keep individual blood lead levels below 60 ug/100g, *the mean air lead level would have to be less than 150 ug/m³, but probably not less than 50 ug/m³.* Although these data are the best available evidence, they do not precisely define the air lead level within the 50-150 ug/m³ range which corresponds to a mean blood lead level of 40 ug/100g and an upper blood lead level of 60 ug/100g. In these circumstances, we believe it is appropriate to propose for the permissible exposure limit the air lead concentration that falls in the middle of this range, that is, 100 ug/m³, as the air lead level which is likely to maintain the upper range of workers' blood lead levels below 60 ug/100g.

40 FED. REG. 45938/3-45939/1 (1975) (emphasis added).

quired it to protect these groups. *Id.* at 45936/3.[40] Indeed, the supplemental notice announcing the public hearing stated that comments received from both industry and health groups since the original proposal had revealed that the 100 ug/m³ standard "is actually inadequate to protect a developing fetus." 42 FED. REG. 810/1 (1977).

Obviously, OSHA would have served the parties far better had it listed in the proposal two or more alternative PEL's and invited comments on each, even if it had stated a preference for one of them.[41] But the language of the proposal contains enough suggestions of the possibility of a lower PEL to meet the test of "adequate" notice.[42] Moreover, although at this point we need not consider "substantial evidence," the rule-

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[40] LIA must have had notice that OSHA was considering setting a PEL to protect women of high susceptibility, since it provided testimony at the hearing that setting a PEL to accommodate women of child-bearing age was infeasible. *E.g.*, Joint Appendix (JA) 534-535.

[41] OSHA might also have issued a supplemental notice of rulemaking on this change, as it in fact did to invite comments on medical removal, 42 FED. REG. 46547/1 (1977), and other issues, *id.* at 809. Since OSHA hired DBA to prepare a post-hearing report on the feasibility of the lower PEL in November 1977, months before the hearing record was closed, *see* ALD 20-26, OSHA obviously anticipated the change in time to issue a new notice. We note, however, that the supplemental notice in which OSHA announced the public hearing in the rulemaking, 42 FED. REG. 810/1 (1977), did announce that comments received by that time had shown that the 100 ug/m³ PEL would not protect fetuses.

[42] The rulemaking proceeding itself helps suggest that notice was adequate. For example, Dr. Lloyd testified for the Steelworkers union that the evidence compelled a PEL of 40 ug/m³, below the final PEL, JA 736-751, and Standish Medina, counsel to LIA, cross-examined Dr. Lloyd at length about his contention. JA 838-871.

making produced enough evidence on such issues as subclinical effects of lead to make the lower PEL a "logical outgrowth" of the proceeding.

2. *Notice of means-of-compliance rules.* The question of notice with regard to the respirators as a means of compliance with the PEL is more difficult. The difficulty lies in the confusing—or, more generously, subtle—change between the proposal and the final rule. Part of the confusion is doubltless due to LIA itself, which has read the final standard as inflexibly banning respirators as a means of compliance after the phase-in period, while the final standard in fact appears to allow use of respirators when engineering and work practice controls alone cannot meet the PEL. LIA has both overstated the role of respirators in the proposal and understated their role in the final standard. But OSHA also merits some blame for the confusion, since the compliance rules in the final standard appear ill-drafted and ill-explained, especially in light of their departure from other OSHA final rules as well as the proposed lead rules.[43] Nevertheless, a comparison of the proposal with the final standard reveals that the former adequately anticipated the latter.

The proposal clearly established a hierarchy of preference among the three general means of compliance. Industry was to immediately institute engineering controls. To the extent engineering controls proved infeasible or could not by themselves achieve the PEL, they were to be supplemented by work practice controls, but industry still was to use engineering controls to reduce lead exposure as far as such controls could. 40 FED. REG. 45944/2 (1975). In turn, industry was to use work

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[43] Other OSHA standards contain the same guidelines for reliance on respirators to meet the PEL as did the proposed lead standard. *E.g.*, 29 C.F.R. § 1910.1028(f)(1) (1979) (benzene); *id.* § 1910.1018(g)(1) (arsenic).

practice controls, as a supplement to engineering controls, to reduce lead exposure to the lowest possible limit, and only if this combination of means still did not meet the PEL could industry turn to respirators. *Id.* at 45944/2-3. The proposal thus unmistakably made respirators the last resort, and in fact required each employer to create and carry out a written program designed "to reduce exposures to or below the permissible exposure limit solely by means of engineering controls supplemented, when necessary, by work practice controls." *Id.* at 45944/3.[44] The published explanation of the proposed rule adds that even an employer in full compliance with his own approved written program would be violating the proposed standard if he failed to install all engineering controls that were currently feasible. *Id.* at 45940/1. The proposal thus placed great pressure on industry to meet the PEL as soon as possible without relying on respirators, and even requested "[f]urther information * * * as to the feasibility of reaching the permissible exposure limit solely through the use of engineering controls and supplementary work practices." *Id.*

The compliance rules in the final standard require very careful reading and even imaginative construction. Though we address them in great detail when we review OSHA's feasibility findings, *see* Part VI *infra*, we must briefly summarize them here. The language on which LIA obviously relies is as follows:

> The employer shall implement engineering and work practice controls (including administrative controls) to reduce and maintain employee exposure to lead in accordance with the implementation schedule in Table I below. Failure to achieve exposure levels without regard to respirators is sufficient to establish a violation of this provision.

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[44] The explanation spells out the severely limited conditions for reliance on respirators at 40 FED. REG. 45944/3 (1975).

Section 1910.1025(e)(1). The implementation deadline table, which the proposal did not anticipate, sets different interim compliance periods for each industry covered by the standard; after the specified date the industry must meet the PEL without relying on respirators.

The standard then states, however, that "[w]here engineering and work practice controls do not reduce employee exposure to or below the 50 ug/m^3 permissible exposure, the employer shall supplement these controls with respirators in accordance with paragraph (f)." Section 1910.1025(e)(2). Paragraph (f) goes on to permit use of respirators:

> (i) During the time period necessary to install or implement engineering or work practice controls, except that after the dates for compliance with the interim levels in table I, no employer shall require an employee to wear a negative pressure respirator longer than 4.4 hours per day;
>
> (ii) In work situations in which engineering and work practice controls are not sufficient to reduce exposures to or below the permissible exposure limit[.]

Section 1910.1025(f)(i)-(ii).[45] The standard may appear to contradict itself, first banning all reliance on respirators to meet the PEL and then apparently contemplating reliance on respirators after the phase-in periods end. Nevertheless, with the help of OSHA's

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[45] *See* 52974/1:

> OSHA does not intend, however, to preclude the use of respirators where appropriate as one means (in conjunction with other industrial hygiene measures) of seeking to assure in advance that no worker need ever be removed. * * *

somewhat confusing explanation in the Preamble, we can resolve the apparent contradiction.[46]

The chief innovation in the final rule is to delete the proposal's qualification that industry need only install those engineering controls that are "feasible." OSHA explains in the Preamble that it made the deletion in order to "preclude individual employers from raising and proving the defense of infeasibility of compliance in an enforcement action * * *." 52991/1. Thus OSHA believed it had generally established the feasibility of the new PEL. But elsewhere the Preamble suggests that OSHA did not intend to absolutely prevent an employer from pleading infeasibility in an enforcement proceeding. An employer's failure to meet the PEL without respirators after the interim period would establish a "*prima facie* violation" of the standard. *Id.* (emphasis added). In certain rather ill-defined cases where feasible engineering and work practice controls cannot reduce exposure to the PEL, and in "other cases,"[47] the employer, says OSHA, could raise a defense of infeasibility, but must bear the burden of proving infeasibility. 52991/1, 2. Moreover, "OSHA will take individual claims of infeasibility into account through abatement programs

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[46] We can conceive only one possible construction other than the one we have chosen: that an employer would be guilty of one violation for failing to meet the PEL through engineering and work practice controls alone, and then be guilty of a second violation for failing to meet the PEL with respirators.

[47] The Preamble in one place would seem to limit the infeasibility defense to such special situations as "unexpected process upsets" and job tasks "which are performed in locations which are not predeterminable," 52991/1, but it elsewhere suggests that the defense would be more generally available. We attribute the problem to faulty drafting, and resolve it with the construction we offer in text.

tailored to meet the needs of individual firms and their employees." 52991/1.[48]

The final standard thus creates a strong general presumption of the feasibility of meeting the PEL without reliance on respirators after a scheduled phase-in period. Like the proposal, it puts great pressure on employers to meet the PEL through engineering and work practice controls alone as soon as possible. Unlike the proposal, it creates that pressure through a specific timetable and a strict procedural rule for enforcement proceedings. Moreover, the final standard, in a sense, places *more* emphasis on respirators since, unlike the proposal, it does not require employers to install all feasible engineering controls *immediately*, but allows primary reliance on respirators during the interim periods. Finally, whereas the proposal required industry to try to meet the PEL solely through engineering controls before it resorted to work practice controls, the final standard treats these two means of compliance as equally acceptable.

Once again, the agency might have given clearer notice of the potential change from the proposed rule. And the industry parties' attacks on the combined effects of the lowered PEL and the deletion of the feasibility qualification are certainly plausible. But the question is still whether the agency did a legally adequate job, not whether it did the best possible job.

LIA argues that had the changes been properly noticed, both OSHA and the industry could have done detailed feasibility studies of the new standard. We assume that fuller notice might have added something to the

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[48] Reference to "abatement" also is confusing. The OSH Act and regulations provide for "variances," not for abatements, and such variances may be of little use to employers whose compliance problems will last indefinitely. We discuss this issue at length when we take up the larger feasibility question. *See* text and notes at notes 100-104 *infra*.

record. But "[w]e must be satisfied * * * that given a new opportunity to comment, commenters would not have their first occasion to offer *new and different criticisms which the Agency might find convincing.*" *BASF Wyandotte Corp. v. Costle*, 598 F.2d 637, 642 (1st Cir. 1979) (emphasis added), *cert. denied*, —— U.S. ——, 48 U.S. L. WEEK 3533 (Feb. 19, 1980). The First Circuit went on to say:

> Not only do we think that petitioners had fair notice * * *, but we cannot think how their comments would have differed fundamentally if they had known what EPA would do. Though they would have had a different proposition against which to argue, their proposed solutions would, presumably, have been the same for the same reasons. They might have responded in greater volume or more vociferously, but they have not shown us that the content of their criticisms would have been different to the point that they would have stood a better chance of convincing the Agency * * *. * * *

598 F.2d at 644, *see* 5 U.S.C. § 706 (1976) (in reviewing agency action "due account shall be taken of the rule of prejudicial error"). This notion of a "harmless error" rule for notice questions applies to LIA's argument here. LIA contended that the proposed standard was infeasible, and would have done the same for the final standard. OSHA would still have believed LIA's cost estimates grossly inflated and its vision of future technology too cramped, and would still have asserted its legal power to force changes of uncertain cost and technological feasibility.[49]

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[49] The American Iron & Steel Institute (AISI) contends that the notice was inadequate because the proposed PEL, which would have been feasible for its member industries, lulled them into avoiding the feasibility issue at the rulemaking. AISI argues that the change to the lower PEL—which it claims is not feasible for its members—created a

Two other industry petitioners make special challenges on the notice issue with respect to the lower PEL and the new respirator rule. The National Association of Recycling Industries, Inc. (NARI), whose members face a phase-in period only half as long as that of the primary lead producers, contends that the proposal did not give notice that compliance deadlines would not be uniform. The proposal gave ample notice, however, that the rulemaking would address the feasibility of the standard for all affected industries, 40 FED. REG. 45934/2 (1975), and the detailed evidence of the compliance difficulties of the different industries adduced at the hearing certainly makes the differing compliance deadlines a "logical outgrowth" of the proceeding. Moreover, NARI's use of precedent is in error. We have, as NARI argues, remanded to OSHA where the agency had not developed enough information about the relative abilities of different industries to meet a standard. *Industrial Union Dep't, AFL-CIO v. Hodgson, supra,* 499 F.2d at 480. But the ground for remand there was the agency's failure to conduct enough cross-examination on that issue to create a proper record, a ground irrelevant to the notice issue and perhaps even barred now by *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc., supra.* In *Synthetic Organic Chemical Manufacturers Ass'n v. Brennan,* 506 F.2d 385, 388-390 (3d Cir. 1974), *cert. denied,* 423 U.S. 830 (1975), the court

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feasibility issue where it did not previously exist, and so effectively denied AISI a hearing on the feasibility question. We assume AISI's claim is in good faith, and the absence of its arguments on infeasibility from the record may be unfortunate, but the absence is due more likely to AISI's strategically faulty response to the notice of rulemaking than to the failure of the notice itself. As we have shown, the proposal gave adequate notice of the possibility of a 50 ug/m^3 PEL, and so AISI could have anticipated the feasibility issue. We take the same view of the similar claims of such parties as the Corning Glass Company. *See* JA 2528.

did state that the agency had given insufficient notice that it would promulgate a nonuniform rule, but that case was controlled by the special statutory provision on giving notice after submission of an advisory committee's report, 29 U.S.C. § 655(b)(2) (1976), not by the general notice requirement.

The Bell System points to a very subtle change from proposed to final rule: The final rule not only lowered the PEL, but changed the formula for the PEL from an eight-hour Time Weighted Average (TWA) based on a 40-hour work week to an eight-hour TWA without reference to a work week. Bell contends that this change was critical for the telecommunications industry, whose exposure to lead is both low and extremely intermittent, and that under the proposed rule Bell might not have been covered by the standard in the first place. Bell, however, did participate in the proceedings, JA 1383, perhaps as a result of the clear notice in the proposal that the standard would "apply to *all* workplaces in *all industries* where lead is occupationally present or released." 40 FED. REG. 45937/3-45938/1 (1975) (emphasis added).[80]

Finally, LIA makes notice challenges to two other elements of the final standard. First, it contends that the proposal gave insufficient notice that the new standard would require employers to perform quantitative fit tests on all respirators, Section 1910.1025(f)(3)(ii), and to provide an air-purifying respirator to any employee who requests one, Section 1910.1025(f)(2)(ii). This chal-

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[80] Bell's use of precedent is also faulty. Though *American Iron & Steel Institute v. OSHA*, 577 F.2d 825 (3d Cir. 1978), *cert. granted*, —— U.S. ——, 48 U.S. L. WEEK 3852 (June 24, 1980), remanded the coke oven standard with respect to independent contractors, the notice of rulemaking there, unlike the one here, failed to announce that the standard would apply to all employers whose workers were exposed to the dangerous substance.

lenge has no merit. The proposal gave ample notice that OSHA believed respirators were often unreliable, 40 FED. REG. 45940/1 (1975). The proposed rule would have allowed employers to use respirators only under the stringent standards set out in 29 C.F.R. § 1910.134(d)-(f) (1978); *see* 40 FED. REG. 45945/1 (1975), and required them to provide air-purifying respirators at certain air-lead levels, *id.* at 45944 Table I. This was sufficient notice, and the evidence that the rulemaking produced on the effectiveness of respirators, 43 FED. REG. 52993 (1978), clearly shows the logic of the change in the final rule, especially given the important new role of respirators during the phase-in periods.[51]

LIA also points to a change in the rule on access to employee medical records. The proposal required that records of measurements of employee exposure to lead be made available "to employees, former employees, or their *designated* representatives." 40 FED. REG. 45947/1 (1975) (emphasis added). The final standard grants employees access to biological monitoring and medical removal records as well, and also makes such records available to "*authorized* employee representatives." Section 1910.1025(n)(4)(ii) (emphasis added). OSHA has apparently confirmed LIA's suspicion that the change in wording means that union representatives may gain access to an employee's medical removal records without the employee's consent.[52] We discuss below LIA's contention that the final rule, so construed, goes beyond OSHA's statutory power and violates employees' rights

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[51] We note that in 1979 OSHA delayed the quantitative fit test requirement for one year beyond the effective date of the standard, and required qualitative fit tests in the interim, while it considers new evidence on the quantitative fit tests. 44 FED. REG. 5446-5448 (1979).

[52] The confirmation comes in a letter that is not part of the record. *See* LIA brief at 89 n.47.

to privacy. *See* Part IV-C *infra*. The question here is whether OSHA gave ample notice for such a change.

OSHA's justification for the change, OSHA brief at 303-304, is a *tour de force* of obfuscation. OSHA contends that "designated" and "authorized" are interchangeable. Were they indeed interchangeable, and if "authorized" meant "authorized by the employee," the whole statutory and constitutional debate over this provision would be unnecessary. But though we can barely follow the explanation in the OSHA brief, the change from the proposal is not great. The new rule simply includes union access as a new means toward the continuing goal of ensuring that employers comply with the standard. Moreover, OSHA's Preamble plausibly suggests that comments and testimony on MRP adduced during the rulemaking made the change reasonable. 53005/3-53006/2. *See Taylor Diving & Salvage Co. v. U.S. Dep't of Labor*, 599 F.2d 622, 626 (5th Cir. 1979) (proposal for employee access to records gave sufficient notice of final rule giving access to the authorized employee representatives). We reserve for our discussion of the substantive validity of the access rule a fuller analysis of the problems it raises.

E. *Denial of Cross-Examination*

One other procedural challenge deserves brief attention. The American Iron and Steel Institute (AISI) objects that OSHA never called a representative of John Short & Associates to testify at the oral hearing, so AISI was denied its right to cross-examine the authors of the report that contained virtually the agency's only evidence on the feasibility of the standard for AISI member industries.[53] Whether the Short Report constitutes

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[53] Such other key consultants as Nicholas Ashford and David J. Burton did testify and were cross-examined. *See* text and note at note 32 *supra*.

substantial evidence to support the feasibility of the standard for these "other industries" is a serious question in this case, and one which we address later in great detail. *See* Part VII-B-8 *infra*. For now, we readily assume that the record on this important question would have been fuller had AISI cross-examined Short. The question here, however, is not the likely effect of such cross-examination on the state of the record, but whether AISI has a particular legal right to develop the record by cross-examination. AISI offers two legal bases for this right, one in the OSH Act and one in the agency's own regulations.

We first note OSHA's argument that AISI was not actually denied the right of cross-examination on this issue. OSHA states that the real author of the sections of the Short Report dealing with AISI member industries was DBA, and that David Burton and his colleagues were in fact cross-examined at length. AISI responds that in proffering the Burton group as witnesses OSHA never informed the parties that these witnesses had helped prepare the Short Report (as opposed to the final DBA report) or were qualified to testify on it. *See* JA 2. Moreover, notes AISI, Burton himself stated under cross-examination that he was not familiar with the economic analysis in the Short Report. JA 170-171. Whether OSHA had some affirmative duty to identify the DBA witnesses as the proper subjects for cross-examination on the Short Report is a novel question. It is subsumed, however, in the question whether LIA had a distinct right of cross-examination here. We will assume that if the law required OSHA to provide opportunity to cross-examine Short, it would require OSHA to give the parties enough information to avail themselves of that opportunity. We find, however, that the law did not require that OSHA give AISI an opportunity to cross-examine Short.

AISI's first purported legal ground is the statutory requirement that OSHA base any standard on "the best available evidence." 29 U.S.C. § 655(b)(5) (1976). But that language says nothing specific about agency procedure, and in light of *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc., supra,* we are loath to discover procedural rules in such general words.[54] AISI's other ground is a bit more troubling. OSHA's own regulation states that "[t]he presiding officer shall provide an opportunity for cross-examination on crucial issues." 29 C.F.R. § 1911.15(b)(2) (1979). And certainly OSHA cannot deny that feasibility is a crucial issue. But the regulation, read in context, is too ambiguous to support AISI's claim. In the same C.F.R. section OSHA explains the cross-examination rule as follows:

> The oral hearing shall be legislative in type. However, fairness may require an opportunity for cross-examination on crucial issues. The presiding officer is empowered to permit cross-examination under such circumstances. * * *

Id. § 1911.15(a)(3). The code section as a whole thus leaves us uncertain whether the presiding officer is *required* to grant cross-examination, or is merely *allowed* to do so. Furthermore, OSHA never actually took advantage of its opportunity to present the authors of the

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[54] We recently construed "best available evidence" to mean something quite different from what AISI contends. In the cotton dust case we held that the requirement of "best available evidence," so far from constraining OSHA, was intended to permit the agency to act immediately to protect workers from a disease even when contemporary science does not fully comprehend how the disease develops. *AFL-CIO v. Marshall,* —— F.2d ——, —— (D.C. Cir. No. 78-1562, decided Oct. 24, 1979) (slip op. at 25-26); *see Industrial Union Dep't, AFL-CIO v. American Petroleum Institute,* —— U.S. ——, ——, 48 U.S. L. WEEK 5022, 5035 (July 2, 1980) (hereinafter cited to Law Week pages only) (plurality opinion).

Short Report as affirmative witnesses for the standard. Thus, even if we construed the rule as guaranteeing cross-examination, we would have to decide whether it guarantees cross-examination of any person who has put evidence in the record, or only of those who have participated in the oral hearing. The regulation offers us no help on this question, but if anything the latter construction seems more plausible. The explanatory language quoted above suggests that a person who seizes the opportunity to give legislative-type testimony at the oral hearing must face cross-examination.

An agency's interpretation of its own regulations is controlling, except where such an interpretation is clearly erroneous. *United States v. Larionoff*, 431 U.S. 864, 872 (1977). Here OSHA has offered no such interpretation in its brief, since it relies on its argument that cross-examination of DBA satisfied any right AISI might possess. Nevertheless, OSHA has effectively interpreted the rule by its actions, and where the rule is so ambiguous we cannot say that OSHA has acted in clear violation of it. Further, the explanation in the regulations emphasizes that "[t]he essential intent is to provide an opportunity for effective oral presentation by interested persons *which can be carried out with expedition and in the absence of rigid procedures which might unduly impede or protract the rulemaking process.*" 29 C.F.R. § 1911.15(a)(3) (1979) (emphasis added). Thus, to uphold AISI's claim here would be to violate the spirit of the rule, however uncertain is its letter.

IV. Substantive Statutory Issues

A. *Medical Removal Protection*

One of the most vigorously contested issues in the case is the substantive validity of the provision for Medical Removal Protection (MRP). OSHA regards MRP as a

sine qua non of the lead standard, insisting that without it employees, fearing they will lose jobs if they demonstrate high blood-lead levels, will refuse to participate in medical surveillance. The industry regards MRP as an illegal and unwarranted extension of OSHA's authority—a cash subsidy to encourage employees to cooperate with medical surveillance when the statute expressly *requires* employees to comply with all provisions of the standard. 29 U.S.C. § 654(b) (1976). The essential question is one of statutory interpretation. LIA contends that MRP lies outside OSHA's statutory grant of authority, contradicts the will of Congress as manifested by the OSH Act's legislative history, and violates an express prohibition on OSHA's power within the statute.[55] We reject LIA's contentions.

1. *The MRP program.* MRP supplements the medical surveillance provisions of the lead standard. All employers are required to measure the air-lead content of all workplaces to determine whether employees suffer exposure to lead above the "action level" of 30 ug/m^3, or above the PEL. Section 1910.1025(d). For any workers exposed to air-lead above the action level for more than 30 days a year, the employer must offer a program of biological monitoring, including exhaustive blood measurements, other laboratory tests, and detailed medical examinations. Section 1910.1025(j). If these tests and examinations reveal that a worker has a high blood-lead level or some ailment attributable to lead exposure, the employer must remove the worker from the high-exposure workplace. The standard sets out the criteria for and

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[55] LIA also contends that MRP fails the statutory test of economic feasibility. Since the cost of MRP cannot be disentangled from the industries' technological capacity to lower air-lead exposure, we address this question later as part of our general inquiry into the feasibility of the standard. *See* Part VII-B-10 *infra*.

terms of this removal in great detail. Section 1910.1025 (k).

The standard will ultimately require employers to remove any worker who is exposed to air-lead at or above the action level [56] and whose blood-lead level averages 50 ug/100g or more on three consecutive blood tests (or on all tests conducted over a six-month period if the worker's last three tests took place over a period of less than six months), unless the worker's blood-lead level on the last of these tests is at or below 40 ug/100g. However, since a great number of employees currently have blood-lead levels well above these figures, OSHA found it infeasible to enforce these removal criteria immediately. 52974/2. OSHA therefore has phased in the removal standard gradually, with three preliminary stages requiring removal at progressively lower blood-lead and air-lead levels.[57] For each stage of the removal standard OSHA has also designated the reduced blood-lead level which employees must achieve before they can return to the jobs from which they were removed.[58]

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[56] To reduce lead exposure below the action level, the employer must achieve an air-lead level of less than 30 ug/m^3 *without relying on respirators.* Section 1910.1025(b).

[57] During the first year of the standard the employer must remove any worker exposed to air-lead at or above 100 ug/m^3 whenever a periodic and follow-up blood test reveals the worker's blood-lead is at or above 80 ug/100g. During the second year the employer must remove a worker exposed to air-lead at or above 50 ug/m^3 when these blood tests measure at or above 70 ug/100g. During the third and fourth years the employer must remove any worker exposed to lead above the action level whose blood-lead is at least 60 ug/100g. Section 1910.1025(k)(1)(i)(A)-(C).

[58] An employee removed because of a blood-lead level of 80 ug/100g or more must show a level at or below 60 ug/100g on two consecutive tests before return. For a worker removed for blood-lead at or above 70 ug/100g, the return figure is 50 ug/100g. For a worker removed because of blood-lead

Finally, the employer must also remove an employee when a "final medical determination" [59] is made that the lead exposure at the employee's workplace threatens his health, and the employer cannot return the employee to the workplace until a final medical determination is made that exposure in the workplace no longer places the employee's health at risk.[60]

The rule on MRP benefits, Section 1910.1025(k)(2), is the true center of the controversy. An employer enjoys the discretion to place a removed worker in a low-exposure job in the same plant, or a job at a non-lead facility, or even to simply retain him at his high-exposure job for a smaller number of hours per week to reduce his time-weighted average exposure level below the action level. 52975/2. If these actions fail, however, the employer must lay the worker off. *Id.* And most important, whatever form removal takes, the employer must maintain the worker's earnings and seniority rights during removal for a period up to 18 months,[61] and must restore

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at or above 60 ug/100g or at an average level of at least 50 ug/100g, the return figure is 40 ug/100g. Section 1910.1025(k)(1)(iii).

[59] "Final medical determination" means the outcome of the multiple physician review scheme or alternate medical determination scheme, § 1910.1025(k)(1)(ii)(B), which we discuss below in some detail. *See* Part IV-B *infra.*

[60] With two special exceptions, the employer may choose to return a worker to his former job while the final medical determination scheme to decide whether the worker can be returned is running its course, so long as that choice is consistent with the opinion of at least one physician who has reviewed the worker's health status. Section 1910.1025(k)(1)(v).

[61] However, if an employee's blood-lead level fails to decline to a safe level within 18 months, the employer may have to maintain his financial benefits beyond that period until a final medical determination is made that the worker can

him to all the rights of his original job status when he becomes medically eligible for return.[62]

2. *General authority under the OSH Act.* The face of the statute and the legislative history both demonstrate unmistakably that OSHA's statutory mandate is, as a general matter, broad enough to include such a regulation as MRP.[63] A number of terms of the statute give OSHA almost unlimited discretion to devise means to achieve the congressionally mandated goal. *See Industrial Union Dep't, AFL-CIO v. Hodgson, supra,* 499 F.2d at 474. Thus OSHA is to ensure worker safety and health "by developing innovative methods, techniques, and approaches for dealing with occupational safety and health problems[.]" 29 U.S.C. § 651(b)(5) (1976). The definition

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never return to his former job, or until the worker is in fact returned pursuant to a final medical determination that such return is medically sound. Section 1910.1025(k)(2)(vi)(C).

[62] The employer may remove an employee at air-lead or blood-lead levels less dangerous than those which trigger mandatory removal, but must then maintain the employee's earnings and seniority rights as fully as the standard demands for required removal. Section 1910.1025(k)(2)(vii).

[63] In the cotton dust case we held that a medical removal provision was within OSHA's statutory power. *AFL-CIO v. Marshall, supra* note 54, —— F.2d at ——, slip op. at 77-80. That provision, however, was a very modest one compared to that in the lead standard, since it only required removal of workers who were incapable for medical reasons of wearing respirators, and even then only when there was a low-exposure job available. The wage-guarantee rule in that provision thus posed a far smaller economic threat to employers than does the lead MRP, and we made clear in the cotton dust case that we were reserving the question of the statutory validity of the more stringent type of removal program. *Id.*, —— F.2d at ——, slip op. at 77-78 n.238. In the asbestos case we described as "salutary" a removal program identical to that in the cotton dust case, *Industrial Union Dep't, AFL-CIO v. Hodgson, supra* note 31, 499 F.2d at 485, but the program had not actually been at issue in the appeal there.

of an "occupational health and safety standard" speaks of "a standard which requires * * * the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment." *Id.* § 652(8). Moreover, an OSHA standard should, "[w]here appropriate, * * * prescribe suitable * * * control * * * procedures" to prevent hazards. *Id.* § 655(b)(7). Finally, "[t]he Secretary * * * shall * * * prescribe such rules and regulations as he may deem necessary to carry out [his] responsibilities" under the statute. *Id.* § 657(g)(2). Thus, as Senator Saxbe stated in noting the similarity of two proposed versions of the Act:

> Neither bill contains, as one might reasonably imagine, a list of specific "do's and don'ts" for keeping workplaces safe and healthful. Industrial safety and health problems are as complex and changing as American industry itself. They cannot be solved by a lengthy list of prohibitions spelled out in a statute.
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> Instead, the bills would set up a legal structure; that is, they would empower an administrative agency to issue detailed safety and health regulations, called standards, which will have the force and effect of law. * * *

Legislative History, supra, at 297-298.[64]

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[64] *See Niagara Mohawk Power Corp. v. FPC,* 379 F.2d 153, 159 (D.C. Cir. 1967):

> [T]he breadth of agency discretion is, if anything, at zenith when the action assailed relates primarily not to the issue of ascertaining whether conduct violates the statute, or regulations, but rather to the fashioning of policies, remedies and sanctions, including enforcement and voluntary compliance programs[,] in order to arrive at maximum effectuation of Congressional objectives. * * *

The scheme of the statute, manifest in both the express language and the legislative history, also appears to permit OSHA to charge to employers the cost of any new means it devises to protect workers. Thus Congress directed all enforcement authority for OSHA standards against the employer, 29 U.S.C. §§ 658, 659(a) (1976), and charged employers with the expense of providing medical examinations to employees, *id.* § 655(b)(7), and of keeping all records necessary for enforcement, *id.* § 657(c). The employer's general financial responsibility under the Act is also implicit in the requirement that

> [e]ach employer shall promptly notify any employee who has been or is being exposed to toxic materials * * * and shall inform any employee who is being thus exposed *of the corrective action being taken.*

Id. § 657(c)(3) (emphasis added).

The report of the Senate subcommittee from which the statute emerged stressed the need to place the cost of standards on employers, noting that

> many employers—particularly smaller ones—simply cannot make the necessary investment in health and safety, and survive competitively, unless all are compelled to do so. The competitive disadvantage of the more conscientious employer is especially evident where there is a long period between exposure to a hazard and manifestation of an illness. In such instances a particular employer has no economic incentive to invest in current precautions, not even in the reduction of workmen's compensation costs, because he will seldom have to pay for the consequences of his own neglect.

S. Rep. No. 91-1282, 91st Cong., 2d Sess. 4 (1970), *reprinted in Legislative History, supra,* at 144.[65] Senator

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[65] The report added that

> employers are * * * bound by this general and common duty to bring no adverse effects to the life and health of

Yarborough, chairman of the parent Committee on Labor and Public Welfare, told the Senate:

> We need a Federal statute, not to try to federalize things, but to equalize the cost in one industry vis-a-vis another. We know the costs would be put into consumer goods but that is the price we should pay for the 80 million workers in America.

Legislative History, supra, at 444. Senator Eagleton, a member of the subcommittee, added that "[t]he costs that will be incurred by employers in meeting the standards of health and safety to be established under this bill are * * * reasonable and necessary costs of doing business." *Id.* at 1150.

LIA points to the statutory requirement that employees as well as employers comply with all OSHA regulations. 29 U.S.C. § 654(b) (1976). But the subcommittee report made clear that this requirement is essentially an exhortation to employees to cooperate in the standards and is not meant

> to diminish in anyway [*sic*] the employer's compliance responsibilities or his responsibility to assure compliance by his own employees. Final responsibility for compliance with the requirements of this act remains with the employer.

S. Rep. No. 91-1282, *supra,* at 10-11, *reprinted in Legislative History, supra,* at 150-151; *see Atlantic & Gulf*

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their employees throughout the course of their employment. Employers have primary control of the work environment and should insure that it is safe and healthful. * * *

S. Rep. No. 91-1282, 91st Cong., 2d Sess. 9 (1970), *reprinted in Legis. Hist., supra* note 22, at 149.

Stevedores, Inc. v. OSHRC, 534 F.2d 541, 553 (3d Cir. 1976).[66]

MRP thus appears to lie well within the general range of OSHA's powers. LIA nevertheless focuses on two signposts of congressional intent to show that the drafters of the statute specifically meant to deny OSHA power to create a program like MRP. First, LIA points out that the OSH Act was passed only a year after the Federal Coal Mine Health and Safety Act of 1969, which required job removal with earnings protection for miners whose chest x-rays revealed they had pneumoconiosis. 30 U.S.C. § 843(b)(2)-(3) (1976). Thus, argues LIA, in 1970 Congress was well aware of the concept of medical removal protection, and so its failure either to require MRP in the OSH Act or at least to expressly delegate to OSHA the power to create it proves that Congress intended that OSHA not include MRP in any standards.[67] Thus LIA relies on the principle of *expressio unius est*

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[66] In *Budd Co. v. OSHA*, 513 F.2d 201, 203-205 (3d Cir. 1975), the Third Circuit upheld an OSHA decision that employers did not have to pay for the protective footwear which OSHA regulations required employees to wear. But the court stressed the special character of protective devices which the employee would wear off-the-job as well as on-the-job and made clear it was expressing no opinion on the proper party to be charged for other devices and methods. *Id.* at 205. Moreover, the court there failed to address the relevant parts of the legislative history of the OSH Act.

[67] LIA also points out that neither the Coal Act nor the Federal Mine Safety and Health Act of 1977, 30 U.S.C. § 811(a)(7) (Supp. I 1977), protects *seniority* rights as well as earnings, and that whereas OSHA claims plenary authority to institute MRP for any occupational disease, the Mine Safety Administration, in implementing the Coal Act, could provide earnings protection only for pneumoconiosis, JA 1214, even though the chest x-rays it gave miners could reveal other occupational diseases, JA 1160-1162.

exclusio alterius. Marshall v. Gibson's Products, Inc. of Plano, 584 F.2d 668, 675-676 (5th Cir. 1978).[68]

We agree that this rule of statutory construction may provide some evidence of congressional intent, but the evidence is hardly decisive, or even strong:

> This maxim is increasingly considered unreliable * * * for it stands on the faulty premise that all possible alternative or supplemental provisions were necessarily considered and rejected by the legislative draftsmen. * * *

Nat'l Petroleum Refiners Ass'n v. FTC, 482 F.2d 672, 676 (D.C. Cir. 1973), *cert. denied*, 415 U.S. 951 (1974). Moreover, the rule can only apply sensibly when we compare very similar statutes, and we find a crucial difference between the two in question here. In the OSH Act Congress invested a new agency with extremely broad jurisdiction to prevent all types of safety and health hazards throughout American industry. In the Coal Act, on the other hand, Congress culminated decades of intense concern for a single industry by creating a sharply focused statute, with 30 pages of safety and health regulations that even surpass an OSHA standard in their detail. 30 U.S.C. §§ 811-878 (1976). Congress may well have avoided all mention of medical removal protection in the OSH Act simply because it thought that mandating such a specific program was inappropriate in a statute so

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[68] In *Gibson's Products, Inc.*, the Fifth Circuit pointed to the express power to obtain inspection injunctions granted other agencies by statute to show that OSHA, which was not given this power by express statute, did not hold it by implication. But the court there relied just as heavily on provisions within the OSH Act showing that Congress had carefully delineated the limited circumstances in which courts had jurisdiction to issue injunctions against employers. *Marshall v. Gibson's Products, Inc.*, 584 F.2d 668, 674 (5th Cir. 1978).

much broader and so much more dependent on agency implementation than the Coal Act.

LIA's second special argument on legislative intent is that the Congress that passed the OSH Act deliberately rejected an amendment, sponsored by Representative Daniels, that would have created a form of medical removal protection. And indeed Section 19(a)(5) of the House bill, H.R. 16785, 91st Cong., 2d Sess. (1970), *Legislative History*, *supra*, at 842, became controversial and even infamous as the "strike-with-pay" provision. LIA notes that Section 19(a)(5) had a purpose similar to that of MRP:

> There is still a real danger that an employee may be economically coerced into self-exposure in order to earn his livelihood, so the bill allows an employee to absent himself from that specific danger for the period of its duration without loss of pay. * * *

H.R. Rep. No. 91-1291, 91st Cong., 2d Sess. 30 (1970), *reprinted in Legislative History*, *supra*, at 860. LIA also points out that Senator Williams, in advocating the Senate bill, felt compelled to reassure his colleagues that it contained no "strike-with-pay" clause and so did not "rais[e] a possibility for endless disputes over whether employees were entitled to walk off the job with full pay[.]" *Legislative History*, *supra*, at 416.

LIA's argument, however, does not survive close reading of Section 19(a)(5), which reveals that the "strike-with-pay" clause differs markedly from the MRP regulation. The rejected clause reads as follows:

> The Secretary of Health, Education, and Welfare shall publish within six months of enactment of this Act and thereafter as needed but at least annually a [l]ist of all known or potentially toxic substances and the concentrations at which such toxicity is known to occur; and shall determine following a

> request by any employer or authorized representative of any group of employees whether any substance normally found in the working place has potentially toxic or harmful effects in such concentration as used or found; and shall submit such determination both to employers and affected employees as soon as possible. Within sixty days of such determination by the Secretary of Health, Education, and Welfare of potential toxicity of any substance, an employer shall not require any employee to be exposed to such substance designated above in toxic or greater concentrations unless it is accompanied by information, made available to employees, by label or other appropriate means, of the known hazards or toxic or long-term ill effects, the nature of the substance, and the signs, symptoms, emergency treatment, and proper conditions and precautions of safe use, and personal protective equipment is supplied which allows established work procedures to be performed with such equipment, or unless such exposed employee may absent himself from such risk of harm for the period necessary to avoid such danger without loss of regular compensation for such period.

H.R. Rep. No. 1291, *supra*, at 12, *Legislative History*, *supra*, at 842. Two features of this clause merit emphasis. First, the grounds for removal derive from *ad hoc*, informal action by HEW. By comparison, the grounds for removal in MRP result from OSHA rulemaking. Second, and perhaps more important, under the "strike-with-pay" clause the employee himself can apparently make the individual judgment that the grounds for removal apply, and so he can effectively remove himself. Under MRP removal is determined solely by OSHA's objective criteria and may indeed occur against the worker's will.[69] Thus the "strike-with-pay" clause would prob-

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[69] For this reason the Supreme Court's recent decision in *Whirlpool Corp. v. Marshall*, —— U.S. ——, 48 U.S. L. WEEK

ably invite controversy and abuse in a way that MRP would not, so the reasons for which Congress rejected the former may well not apply to the latter.

4189 (Feb. 26, 1980), does not support LIA's argument that MRP violates congressional intent. In *Whirlpool* the Court upheld an OSHA regulation forbidding an employer to discriminate against an employee who walks off the job or refuses to perform an assigned task because he reasonably apprehends death or serious injury from a hazard. 29 C.F.R. § 1977.12 (1979). In holding that the regulation lay within OSHA's statutory power the Court rejected the petitioner's argument that Congress' rejection of the Daniels "strike-with-pay" provision bespoke a legislative animus against the regulation in question. —— U.S. at ——, 48 U.S. L. WEEK at 4192-4194. Specifically, the Court stated that the Daniels bill was not concerned with the "highly perilous and fast-moving situations" with which the challenged regulation was concerned, and that the congressional debate over the Daniels bill chiefly focused on a worker's right to continued compensation after he left the job, whereas the challenged regulation made no provision for continued salary during a work stoppage.

The Court's analysis of the Daniels bill might appear to threaten the statutory basis for MRP, since MRP is not concerned with sudden, imminent threats to worker safety, while it does, of course, guarantee a worker's wage when he is removed for safety or health reasons. But a careful reading of the Court's opinion only reinforces our sense of the important difference between MRP and the Daniels bill. The Court stated:

> It is also important to emphasize that what primarily troubled Congress about the Daniels bill's "strike with pay" provision was its requirement that employees be paid their regular salary *after having properly invoked their right to refuse to work under the section.* It is instructive that virtually every time the issue of *an employee's right to absent himself* from hazardous work was discussed in the legislative debates, it was in the context of the employee's right to continue to receive his usual compensation.

[continued]

3. *The Section 4(b)(4) prohibition.* LIA's most serious statutory argument against MRP is that MRP violates the express prohibition contained in Section 4(b)(4) of the OSH Act, 29 U.S.C. § 653(b)(4) (1976):

> Nothing in this chapter shall be construed to supersede or in any manner affect any workmen's compensation law or to enlarge or diminish or affect in any other manner the common law or statutory rights, duties, or liabilities of employers and employees under any law with respect to injuries, diseases, or death of employees arising out of, or in the course of, employment.

LIA argues vigorously that MRP contravenes this prohibition in both purpose and effect. As a matter of purpose, it cites evidence that OSHA designed MRP to remedy the inadequacies of state workmen's compensation laws. JA 1082-1090. But this evidence shows little more than that LIA was able to put its ideas into the mouths of OSHA witnesses during cross-examination, and in any event we do not construe Section 4(b)(4) as being concerned with agency motive. LIA's argument on the effect of MRP does, however, deserve serious attention.

> * * * But the regulation at issue here does not require employers to pay workers *who refuse to perform their assigned tasks* in the face of imminent danger. * * *

—— U.S. at ——, 48 U.S. L. WEEK at 4193-4194 (emphasis added; footnotes omitted). In characterizing the Daniels bill here the Court may have stressed the issue of compensation, but it was clearly speaking only in the context of a worker's self-initiated decision to leave the job after making a subjective decision that the workplace was dangerous. The Court did not address, and of course had no reason to address, the question of requiring compensation of workers who are removed from a job—perhaps against their will—according to objective regulatory criteria. The *Whirlpool* decision thus does not bear on MRP.

Under workmen's compensation law, a worker suffering disablement of a designated type can recover, depending on the state, up to two thirds of his lost wages. These laws presume that if a disabled worker could recover all his lost wages, he would have no incentive to return to work. JA 1087-1088. LIA contends that under MRP a worker would never seek worker's compensation, nor would he ever become medically or financially eligible for it. A worker removed for such a disability would be guaranteed all the earnings rights of his high-exposure job; suffering no loss of wages, he would be entitled to no wage replacement under worker's compensation. Moreover, under MRP most workers would be removed because of high blood-lead levels—before they exhibit clinical symptoms of disablement. Thus they would enjoy their guaranteed salary before they became disabled in the eyes of workmen's compensation law. LIA concludes that for workers vulnerable to lead disease MRP would "supersede" and "affect" worker's compensation law to the point of wholly replacing it.

LIA acknowledges that under the "credit" provision of MRP, Section 1910.1025(k)(2)(iv), the employer could reduce his payments under MRP by the amount the removed employee receives under worker's compensation. But LIA contends that this credit is meaningless since no worker harmed by lead will ever receive worker's compensation in the first place.

To resolve this issue we first recognize that Section 4(b)(4) is vague and ambiguous on its face. We must seek then the best, not a perfect, reading.[70] Thus LIA's

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[70] Unfortunately, the legislative history of the OSH Act tells us essentially nothing about § 4(b)(4). Section 27 of the Act, 29 U.S.C. § 676 (omitted from the 1976 codification), created a National Commission to Study State Workmen's Compensation Laws, and the Senate subcommittee report discussion of this commission is the only allusion the legislative

argument under Section 4(b)(4) really shows that no literal reading of it is possible, since any health standard that reduces the number of workers who become disabled will of course "affect" and even "supersede" worker's compensation by ensuring that those workers never seek or obtain workmen's compensation benefits.

Applied to those workers who, thanks to MRP, never become disabled, the argument certainly proves too much. Nevertheless, LIA's argument, if sharpened, remains plausible, since it can still sensibly apply to a small and special group of workers: those who are removed under MRP pursuant to a final medical determination that they are already disabled, and for whom no low-exposure job of equal salary is available.

We must first reject OSHA's attempt to rebut LIA by asserting that, whereas worker's compensation is "compensatory" in nature, MRP is "preventive." At best, this assertion argues that MRP differs from worker's compensation in purpose, whereas we have said that Section

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history makes to worker's compensation laws. *Legis. Hist.*, *supra* note 22, at 163-165. The report lamented the failure of state law to cover enough workers, to apply to enough forms of disablement, and to keep compensation apace with inflation. It explains the Commission's purpose as being to study the feasibility of federal legislation to remedy these flaws, but emphasizes "that by authorizing this study it is not impliedly recommending federalization of the existing workmen's compensation system," and leaves the whole issue to "an informed decision by Congress * * * in the future." *Id.* at 165. LIA construes this language as denying OSHA the power to draw regulations displacing workmen's compensation law. But as we explain in text below, there is a great difference between a regulation that has the effect of reducing the number of claims made under state law and one that actually alters the terms of workmen's compensation law. OSHA has not "federalized" workmen's compensation law. It has left the legal scheme of that law wholly intact.

4(b)(4) is concerned with effects. At worst, OSHA's assertion is a *non sequitur*.

Nevertheless, though we must take seriously LIA's argument with respect to the special group of workers we have described, we do not think it proves MRP to violate Section 4(b)(4). First, this special group of workers is probably very small, and will become progressively smaller. As the new PEL lowers lead exposure throughout industry, and as older workers with high accumulations of lead retire, 54459/3, fewer and fewer workers will require removal because of manifest disablement from lead. Moreover, workers remaining in this group will still have an incentive to file worker's compensation claims. First, worker's compensation laws universally reimburse workers for the medical expenses of their disablement, while MRP does not. 54471/3. Second, MRP benefits can only last slightly more than 18 months, whereas worker's compensation may replace lost wages for longer periods or even indefinitely. 82 AM. JUR. 2D *Workmen's Compensation* § 382 (1976).[71]

The question remains, then, what *does* Section 4(b)(4) mean, if it *does not* mean that OSHA is barred from creating medical removal protection? We see two plausible meanings. First, as courts have already held, Sec-

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[71] OSHA has also compiled evidence of the many collective bargaining agreements that include some form of earnings protection for disabled workers, and concludes that these programs have not interfered with the operation of workmen's compensation. It notes that under these agreements employers maintain wages pending disposition of worker's compensation claims, receive credits or paybacks once compensation awards are made, and sometimes supplement the compensation awards up to 100% of the worker's lost wages. 54471/2-3. We find this evidence inconclusive, however, since OSHA has not explained whether these agreements would allow workers to receive long-term wage replacements even if they never file compensation claims.

tion 4(b)(4) bars workers from asserting a private cause of action against employers under OSHA standards. *Jeter v. St. Regis Paper Co.*, 507 F.2d 973 (5th Cir. 1975); *Byrd v. Fieldcrest Mills, Inc.*, 496 F.2d 1323 (4th Cir. 1974). Second, when a worker actually asserts a claim under workmen's compensation law or some other state law, Section 4(b)(4) intends that neither the worker nor the party against whom the claim is made can assert that any OSHA regulation or the OSH Act itself *preempts* any element of the state law. For example, where OSHA protects a worker against a form of disablement not compensable under state law, the worker cannot obtain state relief for that disablement. Conversely, where state law covers a wider range of disablements than OSHA aims to prevent, an employer cannot escape liability under state law for a disablement not covered by OSHA. In short, OSHA cannot *legally* preempt state compensation law, even if it *practically* preempts it in some situations.

We conclude that though MRP may indeed have a great practical effect on workmen's compensation claims, it leaves the state schemes wholly intact as a *legal* matter, and so does not violate Section 4(b)(4).

4. *Interference with national labor policy.* As its final statutory argument LIA contends that MRP violates the policies of federal labor legislation. Specifically, LIA asserts that MRP sets in concrete a program that is a traditional and mandatory subject of collective bargaining under federal law, and thus violates the congressional principle that the substantive provisions of labor-management relations be left to the bargaining process. *Local 24, Int'l Brhd of Teamsters v. Oliver*, 358 U.S. 283, 295 (1959). We do not doubt that MRP will have a noticeable effect on future collective bargaining, *see, e.g.*, JA 1180-1183, 1215, but such an effect hardly proves that OSHA has misconstrued legislative intent.

Earnings protection is no doubt a mandatory subject of collective bargaining, but so is any issue directly related to worker safety. *NLRB v. Gulf Power Co.*, 384 F.2d 822, 824-825 (5th Cir. 1967). In passing a massive worker health and safety statute, Congress certainly knew it was laying a basis for agency regulations that would replace or obviate worker safety provisions of many collective bargaining agreements. Congress may well have viewed collective bargaining agreements along with state worker's compensation laws as part of the status quo that had failed to provide workers sufficient protection. *See Legislative History, supra*, at 164.

LIA cites Supreme Court precedent for the principle that new legislation should not be construed to interfere with existing law, *e.g., Administrator v. Robertson*, 422 U.S. 255, 265-266 (1975), but the cited cases simply hold that *repeals* by implication are disfavored. They are thus irrelevant to this case, where no statute is repealed. When an issue related to earnings protection not wholly covered by OSHA regulation arises between labor and management, it will remain a mandatory subject of collective bargaining. Meanwhile we find nothing in the OSH Act or other labor legislation to suggest that Congress could remove from OSHA the power to create a program instrumental to achieving worker safety simply because such a program could otherwise be created through collective bargaining. *See Brennan v. Western Union Telegraph Co.*, 561 F.2d 477, 482-483 (3d Cir. 1977), *cert. denied*, 434 U.S. 1063 (1978). Such an inference would contravene the principle that remedial welfare and labor laws merit liberal construction. *Southern Railway Co. v. OSHRC*, 539 F.2d 335, 338 (4th Cir.), *cert. denied*, 429 U.S. 999 (1976).[72]

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[72] OSHA has also compiled convincing evidence that MRP would not seriously interfere with existing collective bargaining agreements. 43 FED. REG. 54464/1-54465/3 (1978). First, OSHA demonstrated that labor and management had

5. *Reasonableness of MRP.* Having concluded that a program of earnings protection for removed workers lies within OSHA's statutory power, we need finally to inquire whether MRP is a reasonable exercise of that power. Like any OSHA program, MRP must pass the statutory tests of judicial review: OSHA must demonstrate substantial evidence to support any conclusions of determinable fact that underlie the program and, where the new provision cannot rely on factual certainty, must carefully explain the bases of its "legislative" decision to create it. *Industrial Union Dep't, AFL-CIO v. Hodgson, supra,* 499 F.2d at 475-476. This test essentially reinforces the principle that where a statute empowers an agency to make rules necessary to carry out the provisions of the statute, the court will uphold such a rule if it is " 'reasonably related to the purposes of the enabling legislation.' " *Mourning v. Family Publications Service, Inc.,* 411 U.S. 356, 369 (1973), *quoting Thorpe v. Housing Authority of the City of Durham,* 393 U.S. 268, 280-281 (1969).

Here, we have no trouble upholding the agency's decision as reasonable and well grounded in the evidence. OSHA has very precisely articulated the bases for MRP, set forth factual findings where relevant, made all inferences and speculations explicit, and explained why it rejected counter-evidence and proposed alternate programs.

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already proved able to adjust the collective bargaining process to the far broader remedial action mandated by such regulations as the affirmative action programs of the Equal Employment Opportunity Commission. Second, the record contained copious evidence of collective bargaining agreements throughout American industry that contain some form of earnings protection for removed workers; OSHA found proof that these programs had not proved difficult to administer, and so concluded that labor and management could coordinate their agreements with the demands of MRP.

See generally 52972/3-52976/3, 54440/1-54473/3. We need only review the major points briefly here.

OSHA offered two primary bases for MRP. First, the standard's PEL leaves little margin of safety for workers, since even at an air-lead level of 50 ug/m^3 as many as 29.3 percent of all exposed workers will at any time have a blood-lead level over 40 ug/100g, the level which OSHA sets as its goal for *all* workers. 54412/2. However, lead disease is highly reversible in its early stages, since a person removed to a low exposure workplace can excrete accumulated lead. 52972/3. OSHA thus concluded that removal was a preventive device crucial to the standard.

OSHA found, however, that unless workers were guaranteed all their wage and seniority rights upon removal, they would resist cooperating with the medical surveillance program that determined the need for removal, since they reasonably might fear being fired or sent to lower-paying jobs if they revealed dangerously high blood-lead levels. 54442/2-54446/2. The record showed that workers often consumed self-prescribed chelating agents,[73] and lied to physicians about their subjective symptoms, all because they held job security more dear than their health. 54446/3-54447/1 (citing evidence). OSHA also found existing earnings protection programs in private bargaining agreements too few and too lim-

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[73] Chelating agents are drugs which bind themselves to lead when they enter the body and then flush themselves—along with the lead—out of the body. OSHA compiled exhaustive evidence that chelation produces such ill effects as anxiety, nausea, hypertension, and anemia. 53001/2-53004/3. It found that though "therapeutic" chelation—to relieve manifest symptoms of lead disease—and "diagnostic" chelation—to help determine lead disease—might be acceptable, "prophylactic" chelation, which physicians, and employees themselves, practice simply to lower blood-lead levels, is unacceptable under modern medical principles. 53002/3.

ited. 54444/2. Moreover, exercising its statutory authority to rely on experience gained under other health and safety laws in fashioning a standard, 29 U.S.C. § 655(b)(5) (1976), OSHA compiled evidence that even under a congressionally-mandated earnings protection program like the one that is part of the Federal Coal Mine Health and Safety Act, *see* text and notes at notes 67-68 *supra*, workers—perhaps because they were not guaranteed the seniority rights and pay increases of their high-exposure jobs—frequently refused to cooperate in medical review. 54447/1-54449/1. Finally, OSHA found evidence that seniority rights were often the linchpin of any earnings protection, and that required seniority protection could easily be coordinated with collective bargaining provisions on seniority. 54447/1-2.

OSHA also supported each particular criterion and term of the removal program with evidence and explanation. For example, it offered both medical testimony and worker health statistics to demonstrate that workers needed removal protection for at least 18 months to allow the reversible phase of lead disease to subside and reduce their blood lead to safe levels. 54468/1-54469/2. And beyond justifying each element of the final MRP, OSHA soundly explained why it rejected a number of proposed MRP schemes. 54450/1-54451/3.

For example, OSHA rejected the suggestion that it directly *force*, rather than encourage, workers to participate in medical surveillance, since such force might violate their freedom of religion and right to privacy, and in any event could not prevent workers from hiding symptoms and using chelating agents. OSHA also struck down a proposal that instead of requiring removal with earnings protection, OSHA simply require employers to provide workers information on their blood-lead levels and then let the workers decide whether to remove themselves; OSHA found no evidence that workers, given the

choice, would always or even often choose health over job security. And last, OSHA rejected the idea that workers with high blood-lead levels use respirators rather than be removed, pointing to all the evidence it had compiled for other purposes on the inherent flaws of respirator protection.

We therefore conclude that MRP is a reasonable exercise of legitimate authority.[74]

B. *Multiple Physician Review*

Lacking total trust in both the honesty and the competence of company doctors, OSHA included in its detailed rules on medical surveillance a scheme called the Multiple Physician Review Mechanism. Section 1910.1025(j)(3)(iii). Under this mechanism, whenever the standard calls for a medical examination for a worker, the employer may select, and must pay for, the physician. If the employee for any reason wants a second medical opinion, he can request a second examination by a physician of his own choice, again at the employer's expense. If the first two physicians disagree as to whether the employee exhibits any medical harm

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[74] *Amici* representing public interest law organizations and California state labor agencies have argued that MRP is not only legally *valid* under the OSH Act, but is legally *required* by Title VII of the Civil Rights Act of 1964, 42 U.S.C. § 2000e *et seq.* (1976 & Supp. II 1978). They argue that without MRP employers will discriminate against fertile women—to whom lead exposure poses an even greater threat than it does to other workers—by excluding them from all lead-exposed jobs at the outset. A review of an OSHA proceeding, however, is not the place to address hypothetical Title VII questions, and in any event we think fertile women can find statutory protection from such discrimination in the OSH Act's own requirement that OSHA standards ensure that "*no* employee will suffer material impairment of health * * *." 29 U.S.C. § 655(b)(5) (1976) (emphasis added).

from his current lead exposure, the employer and the employee, with the advice of the two physicians they have designated, may designate yet a third physician. The opinion of that third physician, once again obtained at the employer's expense, is binding on the employer unless the employer and employee agree to follow a course of action supported by at least one of the physicians.[75]

LIA contends that the multiple physician review mechanism exceeds OSHA's statutory mandate because it is designed to bolster employee confidence rather than employee health. LIA also argues that the mechanism violates the implicit limits on required medical examinations to be charged to employers contained in 29 U.S.C. § 655(b)(7) (1976). That section states that whenever OSHA deems medical examinations necessary and charges them to the employer, the results of such examinations "shall be furnished * * *, at the request of the employee, to his physician." LIA infers from this language that an employer discharges his statutory obligation by paying for any initial examination and then supplying the reports to the employee's personal doctor. Finally, LIA argues that the record provides no substantial evidence to support the factual assumptions underlying the scheme. None of these contentions passes muster.

The multiple physician review mechanism furthers OSHA's legitimate goals both directly and indirectly. First, OSHA's concern went beyond the employee-

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[75] The standard also permits an employee and employer to agree to any alternate scheme of medical review that meets the standard's requirements for the content of medical examinations. Section 1910.1025(j)(3)(vi). Thus the employee and employer could agree that either the first or second medical opinion be the binding one, or that the employee shall himself choose the first doctor, whose opinion would then be binding. *Id.*; 53001/1.

patient's perception of the company doctor. The agency found that though the great majority of company physicians were honest, many of them lacked the medical sophistication to detect the subtle and elusive signs of early lead disease. The multiple review scheme decreases the chances of a single erroneous diagnosis becoming the final medical determination. It thereby directly enhances worker health. Second, any device designed primarily to enhance workers' confidence in the physicians who examine them for lead disease will in turn enhance their health, since an employee who trusts the integrity and skill of the examining physician will more likely cooperate in, and thereby improve the accuracy of, the examination.[76]

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[76] LIA cites one recent decision holding an OSHA multiple physician review scheme to lie beyond OSHA's statutory power, *Taylor Diving & Salvage Co. v. U.S. Dep't of Labor*, 599 F.2d 622 (5th Cir. 1979), but that case is wholly distinguishable from the present one. *Taylor* addressed an OSHA standard for commercial divers which included a three-tiered physician review scheme to determine whether divers are medically fit to tolerate hyperbaric conditions. If a company-appointed physician found an employee unfit, the employee could procure a second opinion at the company's expense and, if the first two physicians disagreed, a third doctor, chosen by the first two and paid by the company, would make the final decision. As construed by the court and apparently as presented by the agency, the diving scheme was designed deliberately to protect employee job security and to eliminate barriers to entry into the profession. *Id.* at 625. The court held that protecting workers' choice of occupation was not reasonably related to OSHA's statutory mission. Moreover, since the scheme allowed employee-appointed physicians to overrule an employer's decision that a worker was unfit, it impermissibly set a ceiling on medical fitness standards established by employers. OSHA, the court held, was created to set minimum, not maximum, health standards. *Id.*

The diving standard is thoroughly inapposite to the lead standard. First, OSHA has justified the multiple physician

Nor is LIA's construction of 29 U.S.C. § 655(b)(7) (1976) accurate. That section contains the following key language:

> In addition, where appropriate, any such standard shall prescribe the type and frequency of medical examinations or other tests which shall be made available, by the employer or at his cost, to employees exposed to such hazards in order to most effectively determine whether the health of such employees is adversely affected by such exposure. * * *

This language, so far from limiting OSHA's authority, rather plentifully expands it. The phrase "type and frequency of medical examinations" can certainly include second and third opinions requested by the employee, especially where OSHA finds that such review examinations can "most effectively determine" a threat to worker health. The language directing employers to supply medical reports to employees' physicians simply covers those situations in which only company-appointed doctors examine the employee; it in no way limits company-paid examinations to those conducted by company doctors. This section therefore is a rather broad mandate to OSHA to

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review mechanism in the lead standard as a device to enhance worker health; the agency neither designed nor intended the mechanism to protect access to or security in employment. Second, though a worker who wanted to remain on his job could theoretically obtain a second or third opinion to overturn the original decision of a company doctor to remove him, the lead standard's guarantee of medical removal benefits will leave such an employee little practical incentive to do so. Finally, the provision allowing employers to remove employees—with guaranteed benefits—on more conservative medical criteria than those imposed by the standard, § 1910.1025(k)(2)(vii), ensures that the lead standard does not impose maximum health standards.

charge to employers whatever scheme of medical review it deems reasonably necessary.[77]

Reasonable necessity is then the remaining question. OSHA compiled record evidence that the "inherent biological variability" of lead disease meant that no one medical specialty was uniquely suited to diagnose it and that many company physicians had difficulty recognizing it. OSHA therefore concluded that multiple physician review increased the chances of correct diagnoses. 52998/1-2. The agency found support for this view in the multiple physician review schemes contained in other statutes and in collective bargaining agreements. 52998/2-3. OSHA also gathered evidence that worker distrust of company physicians was both widespread, 52999/1, and often justified. Many company physicians fail to inform employees of their high blood-lead levels, or disclose that information to the employer rather than to the employee, or grossly misrepresent the toxic effects of lead to the employee. 52999/1-2. Perhaps most important, OSHA found that many company doctors frequently engaged in the unsound and even harmful practice of prophylactic chelation of employees with high blood-lead levels. 52999/2. Thus, although OSHA believed that the majority of company physicians are "sincerely devoted to worker protection," 52999/3, it found sufficient evidence of incompetence or unethical practice among a significant minority of these physicians to justify the special precautions of the multiple physician review mechanism.

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[77] Employers, of course, retain some control over the costs of the multiple physician review scheme, since complying with the PEL and employing physicians who inspire trust in the employees should reduce the number of occasions in which employees invoke the scheme.

C. *Access to Medical Records*

The lead standard requires employers to maintain a variety of health records on exposed employees, including records of exposure monitoring, medical surveillance, and medical removals. Section 1910.1025(n). OSHA has created three rules for access to these records:

> *Availability.* (i) The employer shall make available upon request all records required to be maintained by paragraph (n) of this section to the Assistant Secretary and Director for examination and copying.
>
> (ii) Upon request, the employer shall make environmental monitoring, biological monitoring, and medical removal records available to affected employees, former employees or their authorized representatives for inspection and copying.
>
> (iii) Upon request, the employer shall make an employee's medical records required to be maintained by this section available to the affected employee or former employee or to a physician or other individual designated by such affected employee or former employees [*sic*] for examination and copying.

Section 1910.1025(n)(4).

The rules are not a model of draftsmanship, but we can hazard a plausible construction. First, all records of all medical examinations and tests of employees conducted pursuant to the standard are available, without the employee's permission, to OSHA and to the Director of the National Institute for Occupational Safety and Health, and to the employees themselves and any persons they expressly designate to receive the records. Second, "authorized" representatives of the affected employees have access to a limited class of records. The definition of "authorized" and the scope of that limited class of records are problems of construction we must address be-

low. LIA argues that "authorized" representatives are union officers to whom the standard makes employee medical records available without the employee's permission, and that the limited class of records alluded to in Section 1910.1025(n)(4)(ii) includes highly confidential results of physician examinations.

LIA contends that in granting access to employee medical records without employee permission to both the government agencies and "authorized" representatives, OSHA has strayed beyond its statutory powers and the reasonable demands of its mandate to protect worker health, and has violated employees' constitutional right to privacy.

We note first that we have very serious doubts about LIA's standing to raise these issues. LIA does not claim that the medical record access provisions pose any financial injury to employers, as do the other provisions of the lead standard. And the privacy rights which the access rules allegedly threaten belong, of course, not to LIA but to individual lead industry employees, none of whom challenges the rules in this case. LIA can plausibly argue that since the access provisions impose legal duties on employers and thus subject them to legal sanctions for noncompliance, it does face injury in fact, and that since any decision on the validity of these provisions will directly affect the privacy rights of workers, it has *jus tertii* standing to assert those rights on behalf of workers. *Craig v. Boren*, 429 U.S. 190, 192-196 (1976). But such an argument in turn raises a serious question of ripeness, since LIA has not claimed that the government or anyone else has so far attempted to enforce the regulations against any employer to obtain the records of any particular employee. Nevertheless, since careful construction reveals the provisions to be lawful, we prefer not to dispose of the issue on jurisdictional grounds.

We have little trouble rejecting LIA's challenge to the unrestricted access to records the standard grants to OSHA and NIOSH. The statute itself unquestionably permits and even requires such access. 29 U.S.C. §§ 655(b)(7), 657(c)(1) (1976). And, contrary to LIA's contention, the Supreme Court's decision in *Whalen v. Roe*, 429 U.S. 589 (1977), does not invalidate the government's access to medical records as a violation of employees' constitutional rights. In holding that the New York system for recording the identities of people taking prescribed addictive drugs did not violate these people's "zone of privacy," the *Whalen* Court did rely in part on the detailed protections against unwarranted disclosure contained in the statute creating the system. *Id.* at 601, 605. But the Court stated explicitly that it was expressing no opinion on the constitutionality of any system of government collection of confidential information that did not contain similar protection. *Id.* at 605-606. *Whalen*, indeed, *supports* OSHA's position here, since the Court clearly rejected the notion that required disclosure of private medical information to public health agencies or other bodies charged with the public welfare violated the Constitution, *id.* at 602, and refused, in the absence of concrete proof, to entertain speculation that such bodies will engage in unwarranted public disclosure of such information, *id.* at 601.

LIA finally argues that even if the government is entitled to *some* private information, OSHA has not shown why the government needs *unlimited* access to *identifiable* medical records. We think, however, that OSHA was reasonable in finding that to ensure compliance with the standard it needs not only general information on employee health, but also specific information on individual workers to ensure that no single exposed employee suffers any illegal threat from lead. Moreover,

to obtain express permission for disclosure from each of millions of workers would create an unthinkable administrative burden and risk the health of workers who for unfortunate but understandable reasons might fear any disclosure of their health records. The rule on government access thus meets the demand of *Whalen* that such required disclosure be a reasonable exercise of government responsibility over public welfare, *id.* at 597-598, and the requirement under the OSH Act that any OSHA program be reasonably related to the general goal of preventing occupational lead disease, 29 U.S.C. § 652(8) (1976).

The grant of access to "authorized" representatives of employees does raise serious problems. The first problem is to discern exactly who these "authorized" representatives are. Neither the standard itself nor the explanation in the Preamble ever defines the term or distinguishes "authorized" representative from "designated" representative. Were we to conclude that the two terms mean the same thing, the provision would pose no legal problems whatever, since the latter term obviously refers to people expressly permitted by the employee to inspect his records.[78] But to construe the terms to be-

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[78] Explaining the term "designee" in the new general OSHA rule for access to employee medical records, 29 C.F.R. § 1910.20(d) (1979), OSHA in fact states that such a person has to obtain the written permission of the employee before seeing any of the employee's records. 43 FED. REG. 31373/3 (1978).

In passing, we must chide OSHA for failing to explain the intended relationship between the general new rule in § 1910.20(d) and the new rule specific to the lead standard. We must assume that § 1910.20(d) sets the access rules for the OSHA standards except where a particular standard contains a different rule. We must also criticize OSHA for the suggestion in its brief that this new general rule will set administrative guidelines to protect employee confidentiality and thus bolster the lead standard against a consti-

identical would render the special provision in Section 1910.1025(n)(4)(ii) meaningless. In its brief LIA cites a letter from Grover C. Wrenn, Director of OSHA's Health Standards Program, confirming LIA's suspicion that "authorized" representatives are officers of an employee's labor union. LIA brief at 89 n.47. Though we are loath to rely on material outside the record,[79] we must, in order to make some sense of the regulation, adopt that reading.[80] And since the regulation neither requires such a representative to get the employee's permission to see his records nor bars the representative from seeing the records if the worker objects, we must read it as giving the unions an independent right of access to whatever records are covered by this section.

We then face the second problem—to decide exactly what records the union may see. The "environmental monitoring" and "biological monitoring" records to which Section (n)(4)(ii) refers simply include, of course, measurements of air-lead exposure in the workplace and of individual workers' lead and zinc protoporphyrin levels. Section 1910.1025(j)(2). The ambiguous term in Section (n)(4)(ii) is "medical removal records." As LIA points out, and as we have discussed earlier, *see*

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tutional privacy challenge: We find nothing in § 1910.20 that limits the danger of unwarranted disclosure under the lead standard, unless we are to read the general rule's limit of disclosure to employee "designees" as superseding the lead standard rules—thus rendering completely meaningless OSHA's argument that the lead standard allows union representatives access only to a narrow category of employee medical records. *See* text at note 83 *infra*.

[79] OSHA has acted with unseemly coyness on this issue, never in its brief expressly denying or conceding that LIA's reading of "authorized representative" is correct.

[80] We add, however, that a union officer is only "authorized" under the regulation if the union is the employee's officially recognized bargaining agent under federal law.

text and notes at notes 56-62 *supra*, a worker may be removed because medical examinations reveal he has a medical condition caused or threatened by lead exposure, or because he has a high blood-lead level. The medical examination which forms the basis of removal may contain very intimate details of medical history and medical condition—including information about pregnancy and fertility. Section 1910.1025(j)(3)(ii).

The recordkeeping requirements of the standard, however, contain a special section entitled "Medical Removals." This section requires employers to maintain records on all removed employees and states that these records "shall *include*:"

> (A) The name and social security number of the employee;
>
> (B) The date on each occasion that the employee was removed from current exposure to lead as well as the corresponding date on which the employee was returned to his or her former job status;
>
> (C) A brief explanation of how each removal was or is being accomplished; and
>
> (D) A statement with respect to each removal indicating whether or not the reason for the removal was an elevated blood lead level.

Section 1910.1025(n)(3)(ii) (emphasis added). OSHA argues that the "medical removal records" mentioned in Section (n)(4)(ii) refer only to this limited information.

The bare language of the standard, unaided by the agency's construction, cannot resolve the ambiguity. Section (n)(4)(ii) speaks generally medical removal records, and does not specifically refer to Section (n)(3)(ii). That latter section, moreover, says that medical removal records "shall include" the limited facts listed there, not that they shall contain *only* those facts.

We agree with LIA that if the standard allows the unions, without the employee's permission, to examine the intimate results of physician examinations—information to which the employee and the government do have rightful access—it may violate the statute and the Constitution. After requiring OSHA to create a scheme of medical examinations and tests to determine whether workers are suffering harm from lead exposure, the statute says:

> The results of such examinations or tests shall be furnished *only* to the Secretary or the Secretary of Health, Education, and Welfare, and, at the request of the employee, to his physician. * * *

29 U.S.C. § 655(b)(7) (1976) (emphasis added). Though the statute itself is a bit ambiguous in its reference to "examinations or tests," at the very least Congress must have been thinking of actual physician examinations, since the records of such examinations obviously contain more confidential information than any other records. Moreover, though *Whalen* makes one passing reference to the constitutional propriety of disclosing confidential health records to nongovernment parties,[81] the Court's emphasis on *state* interests in these

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[81] Nevertheless, disclosures of private medical information to doctors, to hospital personnel, to insurance companies, and to public health agencies are often an essential part of modern medical practice even when the disclosure may reflect unfavorably on the character of the patient.[29] * * *

> 29. Familiar examples are statutory reporting requirements relating to venereal disease, child abuse, injuries caused by deadly weapons, and certifications of fetal death. Last Term we upheld the recordkeeping requirements of the Missouri abortion laws against a challenge based on the protected interest in making the abortion decision free of governmental intrusion, *Planned Parenthood of Central Missouri v. Danforth*, 428 U.S. 52, 79-81.

[continued]

records suggests that it would not permit the state to force disclosure of at least highly confidential information to private parties.[82]

Under OSHA's construction, however, disclosure of "medical removal records" to labor unions probably avoids statutory and constitutional problems. As we noted above, Congress appeared to restrict access to confidential records to the government and to the employee and his physician in Section 655(b)(7). That same section, in requiring OSHA to prescribe "medical examinations or other tests," described the purpose of those examinations and tests as "to most effectively determine whether the health of such employees is adversely affected by such exposure." *Id.* Congress may thus have intended the access restrictions in this section to apply only to those examinations and tests which actually detect symptoms of lead disease. The limited information required for medical removal records in Section (n)(3)(ii) of the lead standard does not address actual symptoms of illness, and thus may escape the restrictions of Section 655(b)(7). The one other statutory reference to access to employee health records, while not clearly permitting private parties access to the sort of limited health infor-

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Whalen v. Roe, 429 U.S. 589, 602 (1977). Though the sentence in text may be meant to characterize disclosure to such private parties as insurance companies as a fact of life rather than as a legally accepted practice, the footnote leaves the matter uncertain.

[82] As we note in text below, we assume that records of complete medical examinations contain information of sufficient intimacy to raise the constitutional questions addressed in *Whalen*. We assume quite the contrary for the medical removal information listed in § (n)(3)(ii) of the lead standard.

mation described by Section (n) (3) (ii) of the standard, certainly does not prohibit it.[83]

Moreover, disclosure of such limited information—even to private parties—probably does not even invoke the privacy questions addressed in *Whalen*, much less violate the Constitution. The Court in *Whalen* stressed two key aspects of the information about patients' prescribed use of controlled drugs. First, the information might lead the patients to be stigmatized as drug addicts. *Whalen v. Roe*, *supra*, 429 U.S. at 595. Second, information about prescriptions intruded deeply into the privacy of the doctor-patient relationship. *Id.* at 596. Records of complete medical examinations could conceivably possess the first of these aspects, and most assuredly possess the second. The bare information required by Section (n) (3) (ii) of the lead standard, however, could stigmatize the employee only in the most perversely imaginative mind, and barely touches the surface of the doctor-patient relationship.

OSHA's construction of the scope of medical removal records to be disclosed under Section (n) (4) (ii) of the

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[83] The Secretary * * * shall issue regulations requiring employers to maintain accurate records of employee exposures to potentially toxic materials or harmful physical agents * * *. Such regulations shall provide employees or their representatives with an opportunity to observe such monitoring or measuring, and to have access to the records thereof. Such regulations shall also make appropriate provision for each employee or former employee to have access to such records as will indicate his own exposure to toxic materials or harmful physical agents. * * * Section 1910.1025 (n) (3) (ii).

This section leaves the meaning of "representatives" ambiguous, and fails to define the scope of the records to which it mandates access. The legislative history is barren on the issue. In any event, whatever the section means, it appears to create minimum, not maximum, rights of access.

standard thus avoids statutory and constitutional problems. Moreover, an agency's own construction of its regulation is controlling, unless it is plainly erroneous or patently inconsistent with the regulation. *United States v. Larionoff*, *supra*, 431 U.S. at 872. OSHA's construction does appear consistent with the scheme and language of the regulation, since the proximity of Sections (n) (3) (ii) and (n) (4) (ii) suggests that the phrase "medical removal records" in the latter was meant to refer to the identically-worded title of the former.

For all the reasons we have discussed, disclosure of limited medical removal information to the labor unions, as we have construed it, is lawful. Though its explanation in the Preamble to the standard is annoyingly sparse, OSHA appears to have recognized the interest of employees in the privacy of their medical records, but concluded, on *balance*, that the need to ensure compliance with the standard justifies disclosure of the carefully limited information outlined in Section (n) (3) (ii). *See* 53006/2. Though the issue is troublesome, we cannot in the end fault OSHA for this conclusion. The unions can help OSHA greatly in the massive job of ensuring that employers are following the medical removal rules of the lead standard, and can even serve as a check on OSHA itself—in effect monitoring the work of the government monitors. In this regard the unions, like the government, might be hampered in their task of protecting worker health by any requirement that they obtain individual permission from each removed worker before examining the facts described in Section (n) (3) (ii) of the standard. Indeed, such a requirement might be self-defeating, since unless they obtained this information directly from the employer the unions might have difficulty in even discovering which workers had been removed in the first place.

V. Permissible Exposure Limit

OSHA's creation of a permissible exposure limit for lead raises intertwined statutory and evidentiary issues. To resolve these difficult issues, we must address the relationship between and the respective language of the statutory sections under which OSHA must operate, and examine the sequence of reasoning which led OSHA to a PEL of 50 ug/m^3.

A. *The Threshold Question: "Reasonable Necessity" and "Significant Risk"*

The statutory criteria governing OSHA's creation of permissible exposure limits for toxic substances appear in two sections of the Act. Section 3(8) generally defines a "standard":

> The term "occupational safety and health standard" means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe and healthful employment and places of employment.

29 U.S.C. § 652(8) (1976). Section 6(b)(5) of the Act then sets out the Secretary's duties in creating a standard for dangerous substances:

> The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. Development of standards under this subsection shall be based upon research, demonstrations, experiments, and such other information as may be appropriate.

> In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, the feasibility of the standards, and experience gained under this and other health and safety laws.

Id. § 655(b)(5). Though the first of these provisions might appear to be definitional only, with the second specifically announcing the protective goal at which OSHA must aim and the resources on which it must draw, a plurality of the Supreme Court, in a decision issued after argument in the present case, has stated that Section 3(8) establishes a threshold responsibility OSHA must carry out before it exercises its authority under Section 6(b)(5). In *Industrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra*, the plurality stated that before OSHA creates a new exposure limit for a toxic agent, it must first "find, as a threshold matter, that the toxic substance in question poses a significant health risk in the workplace and that a new, lower standard is therefore 'reasonably necessary or appropriate to provide safe or healthful employment and places of employment.'" 48 U.S. L. WEEK at 5024.[84] In so construing

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[84] The *American Petroleum Institute* decision affirmed the judgment of the Fifth Circuit, which had invalidated the benzene standard for its failure to adhere to the implicit requirements of § 3(8). *American Petroleum Institute v. OSHA*, 581 F.2d 493 (5th Cir. 1978). But the lack of a majority opinion in the decision and the complex overlapping among the five separate opinions leave the Supreme Court's view of OSHA's statutory responsibilities in some doubt. Indeed, the Court reached no decision on the question that had proved decisive in the Fifth Circuit: whether § 3(8) requires OSHA to weigh the costs of a new standard against its benefits.

Justice Stevens wrote the plurality opinion, and was joined completely by Justice Stewart and the Chief Justice, *Industrial Union Dep't, AFL-CIO v. American Petroleum Insti-*

this section, the plurality made clear its view that Congress had not mandated OSHA to seek an absolutely risk-free workplace, or to require industry to eliminate even insignificant risks of harm so long as the effort is

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tute, supra note 54, though the latter also wrote a separate concurring opinion emphasizing that the courts must continue to grant OSHA great leeway in its essentially legislative decisions on regulatory policy, 48 U.S. L. WEEK at 5036-5037.

Justice Powell concurred in Parts I, II, III-A, III-B, III-C, and III-E of Justice Stevens' opinion, and wrote a separate concurring opinion which took the view that § 3(8) imposed more stringent requirements on OSHA than the plurality opinion had acknowledged. *Id.* at 5037. Justice Powell found that in addition to invoking its presumption about carcinogens—a presumption for which he saw insufficient support, *id.*—OSHA had relied on the "fall-back position" that the benzene standard was based on specific evidence of harm. *Id.* In this view, OSHA had indeed *attempted* to carry its burden under § 3(8) by finding that the benefits of lowering the benzene PEL to 1 ppm were likely to be "appreciable." *See id.* at 5034 (plurality opinion). But Justice Powell took that statutory burden to be greater than Justice Stevens had been willing to hold in this case, and concluded that OSHA had failed to meet it. Justice Powell apparently believed that OSHA had not presented substantial evidence of significant harm from benzene at the current PEL. *Id.* at 5038 (Powell, J., concurring). But he concluded in any event that § 3(8) also required OSHA to determine that the costs of the new standard bore a reasonable relationship to its expected benefits. *Id.* In asserting that an OSHA standard is invalid if its economic effect is "wholly disproportionate" to its likely health and safety benefits, *id.*, Justice Powell, alone among his colleagues, took a partial step toward approving the Fifth Circuit's position that OSHA must attempt a quantitative comparison of the costs and benefits of a new standard to prove the standard "reasonably necessary" under § 3(8). *American Petroleum Institute v. OSHA, supra*, 581 F.2d at 502-503.

Justice Rehnquist concurred in the judgment only, stating in his separate opinion that the first sentence of § 6(b)(5),

not technologically impossible or financially ruinous. *Id.* at 5031. Rather, the Secretary must examine the current exposure level of the toxic substance to determine whether it leaves workers subject to a significant risk, and whether that risk can be eliminated or lessened by lowering the limit. *Id.*[85]

The *American Petroleum Institute* plurality announced its construction of Section 3(8) in striking down OSHA's new benzene standard, which lowered the benzene PEL from 10 parts per million (ppm) of air to 1 ppm. Re-

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mandating OSHA to "set the standard which most adequately assures, to the extent feasible, that no employee will suffer material impairment of health," 29 U.S.C. § 655(b)(5) (1976), was unconstitutional. *Id.* at 5039. Finding the language in this crucial sentence merely precatory, *id.* at 5041, Justice Rehnquist asserted that it failed so utterly to inform OSHA as to what costs the agency could impose on industry in regulating a substance for which no safe level could be found that it violated the nondelegation doctrine established by *Schechter Poultry Corp. v. United States*, 295 U.S. 495 (1935), and *Panama Refining Co. v. Ryan*, 293 U.S. 388 (1935).

Nevertheless, in stating that § 3(8) of the Act did not, as the plurality believed, impose a general check on OSHA's exercise of its standardsetting duty under § 6(b)(5), *id.*, Justice Rehnquist actually created a five-person majority, along with the dissenters, Justices Marshall, Brennan, White, and Blackmun, *id.* at 5043 (Marshall, J., dissenting), for the view that § 3(8) does not place on OSHA any threshold burden of proving "significant harm."

[85] In mentioning this second aspect of the threshold requirement—whether the significant harm at the current level can be eliminated or lessened by a change in the PEL—the plurality implies that § 3(8) requires OSHA to prove by specific evidence the level of risk at the *new* PEL, as well as the current PEL. The plurality leaves this point somewhat unclear, but in any event a requirement of such proof would seem to follow from the second statutory provision governing OSHA's toxic agent standards, § 6(b)(5). *See* Part V-B *infra*.

viewing its assessment of the specific flaws in the benzene rulemaking helps to illuminate the plurality's analysis. In the plurality's view, the benzene standard rested on rigid and categorical assumptions about the health dangers of benzene, rather than specific evidence of its likely harm at the current and new PEL's. According to the plurality, OSHA had taken the position that since benzene is a carcinogen—bearing a proved causal relationship with leukemia—there could be no "safe" level of that substance. *Id.* at 5023.[86] Thus OSHA, avoiding any inquiry into whether benzene posed a significant harm at the current exposure level, proceeded to construe Section 6(b)(5) as requiring it to set the PEL at the lowest feasible level. *Id.*[87] In effect, OSHA invoked a

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[86] According to the plurality, although OSHA had considerable evidence of nonmalignant effects of benzene, it rested its new stringent PEL solely on the likelihood that benzene caused leukemia at low levels. *Industrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra* note 54, 48 U.S. L. WEEK at 5028, 5035. Nevertheless, the plurality noted that OSHA's findings about the nonmalignant harms of benzene were flawed, as was the finding about leukemia, by rigid assumptions and a lack of specific evidence of harm at low levels. For example, OSHA noted evidence that benzene caused nonmalignant blood disorders at levels between 25 and 40 ppm, and then inferred the need for a PEL below 10 ppm simply by applying the "customary" safety factor of 10-100 to the lowest level at which adverse effects had been observed. *Id.* at 5028.

[87] The plurality left its interpretation of OSHA's approach to the benzene standard somewhat unclear in a statement near the end of its opinion, in demonstrating that even OSHA has recognized that it cannot seek to eliminate all risks from the workplace. Justice Stevens stated that OSHA had not proceeded by setting the PEL as close to zero as feasible. "Rather, it began with a 1 ppm level, selected at least in part to ensure that employers would not be required to eliminate benzene concentrations that were little greater than the so-called 'background' exposures experienced by the population at large." *Id.* at 5033. This statement at first ap-

presumption that no safe level of benzene could be determined, and then shifted to the industry parties the practically impossible burden of proving that there was indeed a safe level. *Id.* at 5034.[88] It was thus irrelevant to OSHA whether there was any serious risk of cancer at the current exposure level of 10 ppm. *Id.* at 5026. Rather, "[t]he important point was that there was no evidence that there was *not* some risk, however small, at [the current] level." *Id.* (emphasis in original).

For the plurality, the fatal flaw in the benzene standard was that OSHA had relied on evidence of benzene's carcinogenic effects at extremely high exposure levels, *id.* at 5028-5029,[89] and then simply assumed that lowering

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pears to contradict the plurality's emphatic assertion that OSHA chose to set the benzene PEL at the lowest level feasible. *Id.* at 5023. But the contradiction may only be apparent. As the plurality noted, OSHA focused on the 1 ppm level by adopting the recommendation of its research arm, the National Institute for Occupational Safety and Health (NIOSH). *Id.* at 5025. NIOSH had recommended the 1 ppm level not only because it was slightly above the level of benzene in the general atmosphere, but also because it was the lowest level that could be detected by relatively unsophisticated instruments. *Id.* at 5025 n.14. OSHA may thus have incorporated detectability into its analysis of feasibility.

[88] OSHA rejected industry contentions that epidemiological studies showed no excess risk of leukemia at levels below 10 ppm, as well as industry testimony that a dose-response curve could be constructed and would reveal extremely small incremental benefits from lowering the PEL to 1 ppm. *Id.* at 5029.

[89] In the plurality's view, the only study OSHA had before it suggesting leukemia deaths caused by benzene levels below 10 ppm was flawed by the authors' own conclusion that the workers in that study who had suffered leukemia had been exposed to a number of other carcinogens before they were exposed to benzene, and that other workers exposed to higher benzene levels than the stricken ones were exposed to had not suffered leukemia. *Id.*

the PEL as far as possible would yield "appreciable" benefits. *Id.* at 5034.[90] OSHA had produced no reliable empirical evidence of benzene-caused leukemia at levels of 10 ppm or below. *Id.* at 5029. Moreover, OSHA had not fashioned—and indeed insisted that it could not fashion—a dose-response curve that would have enabled it to infer the likely risk of leukemia at low benzene levels from the established evidence at higher levels. *Id.* at 5028.

> In the end OSHA's rationale for lowering the permissible exposure limit to 1 ppm was based, not on any finding that leukemia has ever been caused by exposure to 10 ppm of benzene and that it will *not* be caused by exposure to 1 ppm, but rather on a series of assumptions indicating that some leukemias might result from exposure to 10 ppm and that the number of cases might be reduced by reducing the exposure to 1 ppm. * * *

Id. at 5029 (emphasis in original).

Indeed, in initiating the benzene rulemaking OSHA had never even asked for comments on whether there was a safe level of benzene, but had simply asked whether the proposed 1 ppm level would be feasible. *Id.* at 5026. Asserting that the agency must bear the initial burden of proving it more likely than not that workers faced a significant risk of harm from long-term exposure to benzene at the current legal level, *id.* at 5034, the plurality concluded that OSHA had never even attempted to carry that burden. *Id.*[91]

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[90] The plurality stressed that even if the finding of "appreciable" benefits were supported by substantial evidence, it would not constitute a finding of "significant harm" at the current exposure level sufficient to satisfy § 3(8). *Id.* at 1034.

[91] The plurality later emphasized that it was expressing no opinion on what sort of factual determinations would enable OSHA to carry its statutory burden. *Id.* at 5035.

Nevertheless, the plurality emphasized the great discretion OSHA retained under Section 3(8), especially in an area where scientific certainty is impossible. *See id.* at 5034. In the first instance, it is the agency itself that determines the existence of a "significant" risk, *id.*, and so the court's review is limited to reviewing the finding for substantial evidence. *Id.* at 5035 n.62. In making the difficult judgment as to what level of harm is unacceptable, the agency may rely on its own sound "considerations of policy" as well as hard factual data. *Id.* Moreover, the agency need not present a precise quantification of risk where even on the best available scientific evidence such precision is impossible, *id.* at 5035,[92] and so long as OSHA relies on reputable scientific authority, it may employ conservative assumptions in assessing the data before it, erring on the side of worker safety. *Id.*

In creating the new lead standard, OSHA has clearly met the Section 3(8) threshold test of proving "significant harm" described by the *American Petroleum Institute* plurality. OSHA nowhere relied on categorical assumptions about the effects of lead poisoning; indeed, since the lead standard does not rest on the carcinogenic effects of lead, OSHA did not even have available to it any general policy dictating that there is no safe level of lead. Nor did OSHA rest on evidence of the dangers of lead at very high exposure levels and then simply infer that those dangers would decrease as the PEL was lowered. Rather, OSHA amassed voluminous evidence of the specific harmful effects of lead at particular blood-lead levels, and correlated these blood-lead levels with air-lead levels. By this means OSHA was able to describe the actual harmful effects of lead on a worker population at both the current PEL and the new PEL. In its proof of significant harm from lead at the current

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[92] Justice Powell's separate opinion specifically supports the plurality in this regard. *Id.* at 5037-5038.

PEL and its careful measurement of the likely reduction in that harm at the new PEL, the lead standard stands in marked contrast to the benzene standard struck down by the Supreme Court.

We will briefly set out the nature of the evidence on which OSHA relied in proving the harmful effects of lead and explain the sequence of reasoning which led OSHA to conclude that the current PEL left workers subject to serious risks of lead poisoning. In doing so, however, we shall treat the evidence in relatively summary fashion, since we shall review all the evidence on the dangers of lead poisoning at given air-lead levels in considerable detail in the next section, when we measure the lead standard against the requirements of the second statutory provision governing standards for toxic substances—Section 6(b)(5) of the Act.

As characterized by the *American Petroleum Institute* plurality, the sole basis for the new 1 ppm level for benzene was the likelihood of a significant number of leukemia deaths at any higher level. In the plurality's view, OSHA had failed to produce any reliable evidence of the number of deaths from leukemia at 10 ppm or below. *See* text and notes at notes 89-90 *supra*. By contrast, the lead standard does not rest on the possibility of predicting the specific number of deaths from a single disease. Rather, in formulating the lead standard OSHA found evidence of a wide variety of significant harms that proved scientifically observable at specific blood-lead levels.

OSHA determined that lead has a wide range of effects. In large doses lead can kill, and kill instantly. In smaller doses it can accumulate in the body and cause irreversible damage to four major parts of the body: the blood, the nervous system, the kidneys, and the reproductive system. In extremely small doses lead produces what became known in the rulemaking as "subclinical effects"

—physiological changes which can be detected by sophisticated laboratory tests, but not by either ordinary clinical examination or by the patient himself, which may be irreversible, and which likely bear a causal relationship with overt lead disease. 52954/1-52960/3.

There was no dispute during the rulemaking that overt, clinically detectable signs of serious lead poisoning occur at blood-lead levels of 80 ug/100g and above. These include loss of appetite, metallic taste in the mouth, constipation, nausea, pallor, fatigue, weakness, insomnia, fine tremors, hyperactivity, and colic. 52954/1. The dispute concerned the harmful effects of lead at levels below 80 ug/100g. Though OSHA found some evidence of such clinically detectable lead effects as anemia at blood-lead levels below 80 ug/100g, 54360/2, its primary finding was that significant subclinical effects occur at blood-lead levels of 40 ug/100g and below.[93]

LIA argues that these effects are not signs of lead disease, but rather are ordinary physiological adjustments to the presence of lead in the body, similar to the body's adjustment to such environmental effects as temperature changes. OSHA, however, inferred a scientific consensus that there is a *continuum* of bodily response to lead exposure, and that these subclinical effects are pathological precursors of clinical lead disease. 52954/3. Indeed, OSHA found that subclinical effects occur at blood-lead levels as low as 10 ug/100g, a figure below the normal level for nonoccupational lead exposure in this country, and that at least one part of the body, the

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[93] In another recent decision of ours, upholding the Environmental Protection Agency's new standards for lead in the general atmosphere, we concluded that the agency's findings of the subclinical effects of lead—findings virtually identical to those OSHA has made here—were easily sufficient to support the new regulation. *Lead Industries Ass'n, Inc., v. EPA, supra* note 7, —— F.2d at ——, slip op. at 49-59.

reproductive system, begins to suffer very serious subclinical effects at 30 ug/100g. OSHA concluded, however, that most of the subclinical effects of lead become significant around 40 ug/100g, and that in any event attempting to reduce all workers' blood-lead levels below 40 ug/100g would be technologically and economically infeasible.

At blood-lead levels as low as 50 ug/100g, lead can lower hemoglobin levels enough to cause anemia. 52955/1. The record also showed that at blood-lead levels as low as 10 ug/100g, lead can interfere with heme synthesis in the blood. This interference with heme synthesis begins to increase exponentially at 40 ug/100g, and at blood-lead levels as low as 50 ug/100g more than 70 percent of exposed workers will exhibit a dramatic inhibition of a key enzyme which helps achieve heme synthesis. 52955/1-52957/1. As for neural damage, the record also showed that lead can deal severe harm to both the central and peripheral nervous systems, creating such effects as encephalopathy, retardation, and irreversible brain damage. OSHA noted some evidence of such effects at blood-lead levels as low as 70 ug/100g, but it also encountered reliable evidence of the serious subclinical effect of reduction in nerve conduction velocity at 40 ug/100g and below. 52957/1-52958/2. With respect to the renal system, OSHA found very ample evidence of kidney dysfunction in workers exhibiting blood-lead levels between 40 and 80 ug/100g. 52958/2-52959/1. Finally, the rulemaking produced virtually undisputed evidence that at 30 ug/100g and above, men suffer impotence, sterility, or interference in their ability to produce normal sperm, while women are subject to a serious risk of such harms as spontaneous abortion, stillbirths, and fetal damage. 52959/1-52960/3. Though we review this evidence in detail in the next section, we note here that OSHA had more than substantial evidence of significant harm to

workers whose blood-lead levels rose to 40 ug/100g and above.

OSHA thus had in mind a general blood-lead level goal of 40 ug/100g. It then set out to determine the maximum air-lead exposure level that would meet this goal. LIA has argued that correlating the blood-lead goal with an air-lead level is unnecessary, since OSHA could meet the blood-lead goal directly through regular biological monitoring of workers. OSHA has rejected this argument, however, finding that sole reliance on biological monitoring would place an unfair burden on workers and prove far less efficient than attempting to control lead at its sources through environmental monitoring. LIA has also argued that, as a scientific matter, air-lead measurements simply cannot be correlated with blood-lead measurement. After weighing the extremely complex medical, statistical, and mathematical evidence, OSHA rejected this argument also. It found a scientific model which, in its view, provided the best available, if not perfect, evidence of such a correlation. Applying this model, it found that, within the limits of feasibility, a PEL of 50 ug/m^3 would substantially achieve the blood-lead level goal of 40 ug/100g. In a later section, we review the more than substantial evidence OSHA produced in support of this correlation. At this point, we briefly note how this correlation helps OSHA meet the Section 3(8) requirement of "significant harm."

As OSHA recognized, the ideal way to express the need for and likely benefits of a new standard would be to measure the actual incidence of significant health effects at the old and new PEL's. OSHA found, however, that the best available scientific tools did not allow such precise measurement. 52967/2. Indeed, where the manifestation of the significant harm of a toxic substance is a wide variety of subclinical effects, rather than—as with benzene—death from a single disease, simple logic sug-

gests that such precise measurement of the incidence of harm is impractical. OSHA did find, however, that it could estimate the air-lead levels at which given blood-lead levels would occur, thereby correlating air-lead levels with the specific harmful effects which it had found to generally occur at these blood-lead levels. *Id.* Because of the great variability of individual responses to lead exposure, no one can accurately infer the precise blood-lead level of an individual worker from the air-lead level to which he is exposed. Nevertheless, using its correlation model, OSHA was able to predict the likely *distribution* of blood-lead levels among workers at a worksite at which air-lead reaches a given level. The model assumes that as the air-lead level changes at a worksite, and as older, long-tenured workers who had accumulated lead under the original air-lead level are replaced by new workers entering the workplace with normal blood-lead levels, the distribution of blood-lead levels for the workers at that worksite will approach an equilibrium. 54427/2. OSHA used the model to estimate the distribution of blood-lead levels at equilibrium at both the current and new PEL's.

Assuming compliance with the current PEL of 200 ug/m^3, the likely distribution of blood-lead levels would be as follows:

Over 60 ug/100g	22.4 percent
50-60 ug/100g	32.6 percent
40-50 ug/100g	28.7 percent
Under 40 ug/100g	16.7 percent
Total over 40 ug/100g	83.7 percent

At the new PEL of 50 ug/m^3, the OSHA model predicts the distribution as follows:

Over 60 ug/100g	0.5 percent
50-60 ug/100g	5.5 percent
40-50 ug/100g	23.3 percent

Under 40 ug/100g	70.7 percent
Total over 40 ug/100g	29.3 percent

52963/2. Thus OSHA found that at the current PEL the vast majority of workers would have blood-lead levels above 40 ug/100g, the point at which, according to the evidence, dangerous subclinical effects of lead are likely to occur. By contrast, at the new PEL the great majority of workers will have blood-lead levels below the 40 ug/100g danger point, and virtually none will have blood-lead levels over 60 ug/100g. At the current PEL, then, the vast majority of workers face a sigsificant harm from lead, and at the PEL that harm disappears for most workers.[94] Of course, at the new PEL, a substantial minority of workers may have blood-lead levels above 40 ug/100g, and other workers are likely to have blood-lead levels above the 30 ug/100g mark at which lead may have serious subclinical effects on the reproductive system. But the lead rulemaking, unlike the benzene rulemaking—as characterized by the *American Petroleum Institute* plurality—did not aim at an absolutely risk-free workplace. Rather, it focused on the serious subclinical effects of lead, and reduced the risk of those serious effects as far as it could within the limits of feasibility. OSHA therefore has carried its burden under Section 3(8).

B. *The Section 6(b)(5) Question: "Material Impairment"*

Having carried its burden under Section 3(8), OSHA must still meet the demands of Section 6(b)(5). *In-*

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[94] Indeed, OSHA asserted in its Preamble that the reduction in the number of workers with high blood-lead levels at the new PEL proved that the benefits of the new PEL outweighed its costs. 54431/1. Of course, since the Supreme Court offered no opinion on the cost-benefit question in *American Petroleum Institute*, see note 84 *supra* & note 102 *infra*, we need not examine that issue here.

dustrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra, 48 U.S. L. WEEK at 5031 n.38 (plurality opinion). To repeat, the key language of that section reads:

> The Secretary * * * shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. * * *

29 U.S.C. § 665(b)(5) (1976). This language is neither precise nor artful. In particular, we note the rather troublesome phrase "most adequately assures." "Adequately," both in normal use and as a contemporary legal cliché, means "suitably" or "passably" or "just barely." Literally read, "most adequately" would seem to require OSHA to set the *least demanding* standard which offers a tolerable degree of protection. That reading, of course, makes little sense in the context of the legislative history and other language in the statute, and we readily assume that Congress used "most adequately" to mean "best." We stress the point, however, to demonstrate the difficulty a court faces in reviewing the work of an agency acting under a statute whose vague language at times seems to reflect more invocational rhetoric than measured legislative mandate.

That difficulty becomes more acute when we consider the two limits this section places on OSHA's power to protect workers. We take up later the most vexing of these limits—the requirement that a standard be "feasible." *See* Part VI *infra*. But in reviewing the PEL we must address the other limit—OSHA's mandate to eliminate "*material* impairment" of health and safety. The word "material," like "adequately," may be mere rhetoric. On the other hand, it may qualify OSHA's power

and discretion.[95] If so, "material" requires careful construction. Does it simply mean something beyond the "trivial" or the "*de minimus*"? Or does it mean the physically overt or manifest? If it means the latter, as the industry argues—and indeed *American Petroleum Institute* suggests that it does not mean the former, *see* text and notes at notes 84-85 *supra*—then from how remote a vantage must OSHA act to protect workers from overt impairment? Must OSHA wait until impairment is overt, or can it act earlier to prevent the impairment from ever becoming overt?

The essential question under Section 6(b)(5) for this case is whether OSHA acted within the limits of its mandate to establish "material" impairment of health when it set a standard designed to protect workers from the subclinical effects of lead. As a statutory matter, after examining precedent and legislative history, we hold that Section 6(b)(5) empowers OSHA to set a PEL that prevents the subclinical effects of lead that lie on a continuum shared with overt lead disease.

LIA's argument that the OSH Act bars the agency from acting to prevent the subclinical effects of lead exposure is *virtually* foreclosed by our recent decision in the cotton dust case. *AFL-CIO v. Marshall, supra.* The textile industry argued there that neither Section 6(b)(5) nor Section 3(8) (allowing OSHA to adopt means "reasonably necessary or appropriate" to protecting workers) permitted the agency to set a PEL designed to prevent the acute but reversible symptoms of byssinosis, since those symptoms were not a "material impairment of health." —— F.2d at ——, slip opinion at 32.

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[95] The legislative history suggests that the phrase "material impairment" was substituted for "any impairment" to ensure that OSHA would not have the power to eliminate every possible hazard to worker health. *Legis. Hist., supra* note 22, at 345, 502-503.

We acknowledged there that the statute did not define "material," but found it unnecessary to decide whether these early symptoms were indeed "material" impairments. —— F.2d at —— n.83, slip opinion at 32-33 n.83. Rather, we assumed that chronic byssinosis was itself a material impairment, and that OSHA could control the early symptoms as a means of preventing the chronic disease from developing. —— F.2d at ——, slip opinion at 33-35. Though OSHA conceded there were serious gaps in medical knowledge about the causal relationship between the acute and the chronic phases of the disease, it had some evidence that the acute symptoms weakened the worker's pulmonary system and made him more susceptible to the chronic phase. —— F.2d at ——, slip opinion at 35.

Here, of course, OSHA is acting to prevent, not overt early symptoms of a disease, but subclinical effects. Nevertheless, the reasoning of our cotton dust holding applies here. We held there that OSHA need not wait until symptoms of a disease appeared, but could act to "reduce the risk" of serious material impairment. —— F.2d at ——, slip opinion at 34-35.

The legislative history amply supports this view. Senator Dominick, a member of the Committee on Labor and Public Welfare, told the Senate that under the statute OSHA would have a mandate to protect a worker sufficiently "so that we can get at something which might not be toxic now, if he works in it a short time, but if he works in it the rest of his life it might be very dangerous[.]" *Legislative History*, *supra*, at 503. Senator Williams of New Jersey, chairman of the subcommittee from which the OSHA legislation emerged, urged the importance of protecting workers against insidious harms even when the workers themselves are "unaware of the nature of such exposure or of its extent," and even when the consequences of overexposure may be "de-

layed or latent." *Id.* at 415. Moreover, Congress intended OSHA to act firmly even in the face of medical uncertainty, not to be "paralyzed by debate surrounding diverse medical opinions." H.R. Rep. No. 91-1291, *supra*, at 18, *reprinted in Legislative History*, *supra*, at 848.

We conclude that if OSHA could find on the basis of substantial evidence that preventing subclinical effects of lead disease would help prevent the true clinical phase of lead disease, the statute empowered it to set a blood-lead level goal to prevent these effects. We must now examine whether OSHA established the presence of these subclinical effects, whether they do bear some causal relation to clinical lead disease, and whether OSHA correctly aimed at a blood-lead level of 40 ug/100g to impede the development of subclinical effects.

C. *The Evidence on Subclinical Effects*

We proceed now to consider the method of evidentiary analysis which OSHA was bound to follow in establishing the presence of these subclinical effects, and in determining as a matter of fact and policy the blood-lead level that can feasibly prevent them. We conclude that OSHA had more than substantial evidence on these issues, and that it explained this evidence convincingly. LIA's argument comes down to a request that we reweigh the evidence, but to do so, of course, is beyond our task. Finally, we hold that OSHA justifiably chose to rely on environmental monitoring as well as biological monitoring, and that the evidence in support of its correlation between blood-lead and air-lead measurements, though controverted, was substantial.

As we noted earlier, in setting an element of the standard OSHA must demonstrate substantial evidence for all matters of determinable fact and, on matters having no possible basis in determinable fact, must explain the relevant considerations on which it relied and its

reasons for rejecting alternate views. *See* Part II *supra.* Moreover, where the standard requires OSHA to set a numerical limit for some phenomenon we must remember that the precise choice of number is essentially a legislative judgment to which we must accord great deference and which only must fall within a "zone of reasonableness." *Hercules, Inc. v. EPA, supra,* 598 F.2d at 107; *see Industrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra,* 48 U.S. L. WEEK at 5035 (plurality opinion). Finally, we cannot expect OSHA to find absolutely conclusive studies on these difficult medical issues:

> Rather, the [agency's] decision may be fully supportable if it is based * * * on the inconclusive but suggestive results of numerous studies. By its nature, scientific evidence is cumulative: the more supporting, albeit inconclusive, evidence available, the more likely the accuracy of the conclusion. * * * [A]fter considering the inferences that can be drawn from the studies supporting the [agency], and those opposing [it], we must decide whether the cumulative effect of all this evidence, and not the effect of any single bit of it, presents a rational basis for the low-lead regulations.

Ethyl Corp. v. EPA, 541 F.2d 1, 37-38 (D.C. Cir.) (*en banc*), *cert. denied,* 426 U.S. 941 (1976) (footnote omitted).

OSHA supplemented publication of its final standard with extremely detailed summaries and explanations of the evidence the rulemaking produced on the harmful effects of lead. 54354-54400. It found serious subclinical effects on four general areas of human biology—the blood, the nervous system, the renal system, and the reproductive system. We must emphasize that, at least theoretically, OSHA need only show substantial evidence for its findings in any one of these crucial areas

to support the standard. Nevertheless, we briefly review the major evidence to show that OSHA made out its case in each area.

1. *Hematological effects.* Heme is the molecule which, in hemoglobin, enables the blood to carry oxygen through the body and which, in cytochromes, aids the cells to use oxygen. Heme synthesis is a complex process involving several enzymes and acids, including delta aminolevulinic acid (ALA), delta aminolevulinic acid dehydratase (ALA-D), protoporphyrin, and ferrochelatase. OSHA found that lead causes chemical reactions which inhibit this synthesis, in particular by reducing production of ALA-D and ferrochelatase. 52995/1-2.

Many studies in the record showed this inhibition of heme synthesis occurring at low blood-lead levels—even at 10 ug/100g, JA 1565-1658 (Thompson); SA 464-470 (Sakurai), 636-643 (Alessio), and increasing exponentially and becoming significantly harmful at levels of 40 ug/100g and above. JA 1781-1792 (Selander), 1802-1813 (Fischbein); Exh. 5(5) (National Academy of Sciences), 294(E) (Zeilhuis). Indeed, at blood-lead levels above 40 ug/100g, more than 20 percent of an exposed population will suffer a 70 percent inhibition of ALA-D, and at 50 ug/100g more than 70 percent of the population will show this 70 percent inhibition. Exh. 294(E) (Zeilhuis). Moreover, at levels as low as 50 ug/100g lead workers actually demonstrate somnolence, memory loss, and other symptoms attributable to the effect of impaired heme synthesis on cellular respiration. Exh. 118 (C) (Lilis). Finally, OSHA had evidence that heme synthesis inhibition at blood-lead levels as low as 50 ug/100g caused lowered hemoglobin and the early stages of anemia, even if the anemia was not apparent to the exposed person. JA 1518-1525 (Tola), 1883-1884 (Wolfe); SA 506-513 (Cooper).

OSHA thus decided that a blood-lead level of 40 ug/100g would be necessary to prevent serious hematological harm. It found support in the recommendations of Dr. Kenneth Bridbord of the NIOSH panel on lead, JA 304, and in the report of the Second International Workshop on Permissible Levels of Occupational Exposure to Lead held in Amsterdam in 1976, SA 1303. And its findings were in harmony with the suggestion of Dr. Sergio Piomelli of New York University that the "alterations in heme synthesis caused by lead fulfill * * * the criteria for material adverse effects on health and can be used to forecast further damage," JA 1726, and that of Dr. Daniel Teitelbaum of the University of Colorado that the metabolic changes associated with heme synthesis are "obvious laboratory evidence of excessive lead absorption," JA 1723.

Aside from its general argument that subclinical effects are not a material impairment of health, the industry offered counter evidence that anemia did not occur below 100 ug/100g, JA 1503 (Cooper), 1529 (Cooper), 1537 (Williams), and generally questioned the methods used by OSHA's studies. OSHA carefully responded to these criticisms, 52954-52957, 52354-52362, noting problems in the studies cited by LIA, and in particular finding the source of much of the dispute in the different hemoglobin levels at which different experts chose to denote the presence of anemia. OSHA also explained why it preferred studies like that of Dr. Tola of Finland, JA 1518-1525, which measured drops in hemoglobin level over time during continued lead exposure. While OSHA conceded that at any one time the drop in hemoglobin level occurring at 50 ug/100g might not raise the need for medical treatment, it expressed concern about the effect of such a reduction over a worker's lifetime on the oxygen-carrying capacity of the blood, 54361/2, thus adhering to the specific mandate of Section 6(b)(5) to protect workers from material harm developing during a lifetime of exposure, 29 U.S.C. § 655(b)(5) (1976).

2. *Neurological effects.* Lead can damage both the central and the peripheral nervous systems. It can harm the central nervous system by causing severe encephalopathy—and hence death, retardation, or irreversible brain damage—as well as mild encephalopathy—and hence dizziness, insomnia, and behavioral changes. 54363/2-54364/3. OSHA found evidence of these effects at blood-lead levels below 70 ug/100g. But OSHA also found striking evidence of a serious subclinical effect of lead on the peripheral nervous system—reduction of nerve conduction velocity (NCV)—at 50 ug/100g. 54364/3-54371/3. OSHA found this effect especially threatening because of the poor regenerative capacity of the nervous system. JA 1495 (Seppalainen).

A Finnish study conducted by Dr. Anna Seppalainen revealed significant subclinical signs of encephalopathy among lead workers at levels below 70 ug/100g. JA 1621-1640. Research carried out by Dr. Lilis and Dr. Fischbein of Mt. Sinai at two secondary smelting plants also found signs of central nervous system damage at levels between 60 and 80 ug/100g, even among workers exposed to lead for as short a time as one year. JA 541-554.

Probably the most significant study in this area was Dr. Seppalainen's on reduced nerve conduction velocity among workers whose blood-lead had never exceeded 70 ug/100g and generally ranged between 35 and 60 ug/100g. JA 1492-1495. In tests generally recognized as scientifically flawless, Dr. Seppalainen found serious reductions in the conduction velocity of the median and ulnar arm nerves of exposed workers, as well as excessive irritability and fibrillation of these nerves. More recent research by Dr. Seppalainen confirmed these effects for workers in the 50 to 59 ug/100g range. SA 1. Though she conceded that such effects may not reduce a worker's subjective sense of well-being, she urged that

the poor regenerative capacity of the peripheral nervous system required a rethinking of the meaning of "safe" levels of exposure. JA 1495. The report of the Amsterdam conference described the reductions observed by Dr. Seppalainen as a "critical effect" of lead, and her findings found confirmation in studies by Repko, SA 1998, and Araki and Honma, SA 758.

LIA criticized the Seppalainen and Repko studies, stressing that Seppalainen's results might really be due to the natural tendency of duller, less adept workers to gravitate toward the less attractive jobs in lead plants. OSHA heard evidence to refute this latter argument, 54369/1, and carefully demonstrated the flaws in LIA's attack on Dr. Seppalainen's testing methods, 54373-54374, finding nothing to rebut Dr. Malcolm's assessment that they were "immaculate," JA 377. OSHA recognized the deficiencies in the Repko study, but found that it nevertheless was useful in corroborating the Lilis-Fischbein study, and that Repko had produced more recent and reliable research revealing impaired visual reaction and other behavioral effects at blood-lead levels below 80 ug/100g. 54366-54367. Finally, OSHA noted that the Lilis-Fischbein study itself was never controverted during the hearings. Thus OSHA accepted the testimony of Dr. Lilis that the reported neurological effects of lead argued for a blood-lead level in the range of 40 ug/100g. JA 468-469.

3. *Renal effects.* The kidneys perform two essential tasks in the body—removing glucose, nutrients, and other useful substances from the urine in order to return them to circulation, and filtering out toxic substances. Lead interferes with the kidneys' work in both these tasks and, by reducing kidney function, can lead to serious renal disease. 54379/2-3. OSHA found evidence that at least 10 percent of workers exposed to lead suffer some degree of nephropathy, JA 283-284 (Wedeen); SA 312 (We-

deen), and that this disease may subtly begin at blood-lead levels well below 80 ug/100g.

The routine tests for nephropathy, however—including the standard blood-urea-nitrogen (BUN) and serum-creatin value (S-creat) tests—will not reveal nephropathy until the kidneys have lost two thirds of their functional capacity. 54380/3. By that time the body may be doomed either to death or to a life sentence of dialysis. JA 278 (Fischbein). Thus OSHA concluded that the renal effects of lead, even more than the other effects, require *preventive action*. OSHA recognized that blood-lead levels in themselves were poor indicators of kidney disease, since the disease is essentially related to the accumulated body burden caused by lead exposure over time rather than to the "snapshot" blood-lead level. Nevertheless, OSHA found that the body's BUN and S-creat levels correlate with the body's ZPP levels. Since the ZPP levels correlate with blood-lead levels, OSHA perceived an important, if indirect, relationship between blood-lead levels and kidney dysfunction, and concluded that lowering blood-lead levels was thus the best available means of preventing occupational kidney disease at its source.

OSHA relied on three primary studies of lead nephropathy. First, Lilis and Fischbein found significant increases in BUN and S-creat levels among workers with blood-lead levels below 80 ug/100g. SA 531, 655, 661. They also found some increase in hypertension, which may itself cause kidney failure. JA 277. Second, a NIOSH study done at the Eagle Picher lead chemicals plant, SA 744, revealed significant renal impairment among workers with blood-lead levels ranging all the way from 39 to 135 ug/100g, and in particular noted a relationship between impaired lead clearance by the kidneys and the duration of the workers' exposure to lead. 54383/1. Moreover, NIOSH confirmed that routine urin-

alysis and BUN and S-creat tests were insufficiently sensitive to detect early renal disease reliably. *Id.*

Third, a research nephrologist, Dr. Richard Wedeen, using sophisticated tests unavailable to the normal practitioner, found nephropathy in 19 of a randomly selected group of 51 lead-exposed workers, and of those 19 only four had blood-lead levels over 60 ug/100g, and only one over 80 ug/100g. JA 279-280. Even when he eliminated from the 19 workers those whose kidney impairment might be due to age or other causes, Wedeen determined that nine percent of the original group suffered lead nephropathy—the same percentage found by the NIOSH study. 54383/3-54384/1.

Dr. Wedeen emphasized that though lead-exposed workers losing 30 to 50 percent of their kidney function felt no symptoms, such dysfunction was indeed "material damage" because it deprived the worker of the functional reserve he needs to protect him from future loss of kidney function from age, hypertension, infection, or other causes. JA 288. Dr. Wedeen stressed the need for *preventing* lead disease, since most physicians, using routine methods of diagnosis, and even following the most authoritative textbooks, will be unable to detect early renal disease and will not even think to look for it among lead-exposed workers with blood-lead levels under 80 ug/100g. JA 286.

Dr Wedeen concluded that though renal disease bears an uncertain relationship to blood-lead levels, the subclinical effects of lead at low blood-lead levels might well portend clinical lead disease, and he specifically recommended 40 ug/100g as the maximum blood-lead level at which workers might be safe from lead-caused harm to their kidneys. JA 296. Dr. Bridbord of NIOSH generally supported this recommendation, finding effects between 40 and 60 ug/100g significant. JA 310.

LIA renewed its general attack on preventing subclinical effects, arguing that the worker will experience no ill effects from even a 50 percent kidney loss. OSHA, of course, can justifiably dismiss the absence of subjective symptoms as irrelevant to its position—that preventing such loss is crucial to ensuring a reserve against future kidney failure. LIA also pointed to several alleged flaws in Dr. Wedeen's methods, notably the absence of a control group. The Wedeen test, however, as noted above, did exclude workers whose renal disease might have been due to causes other than lead, and Dr. Wedeen himself commented that performing intrusive "clearance" tests on workers in whom no renal disease was suspected would have been unethical. JA 2205.

Finally, LIA emphasized the impossibility of drawing a precise correlation between blood-lead levels and renal disease. OSHA, however, made clear that it was not pretending that the 40 ug/100g goal was precisely correlated with the beginning of renal disease, but rather that, as Dr. Wedeen contended, this level provides a reasonable margin of safety against the insidious—but hard to measure—accumulation of body-burden lead in the blood over a worker's lifetime.

4. *Reproductive effects.* OSHA had reported in its original notice of proposed rulemaking findings of the United States Public Health Service and the National Academy of Sciences suggesting that because lead in the blood of pregnant women crosses the placental barrier and because children are susceptible to lead disease at extremely low blood-lead levels, fertile woman workers should be protected from blood-lead levels over 30 ug/100g. 40 FED. REG. 45936/2-3 (1975), JA 1264. The rulemaking produced ample evidence confirming the grave danger lead poses to prospective mothers and fetuses. 43 FED. REG. 54934/2 (1978). LIA did not

strongly argue against this evidence.[96] It contended, however, that precisely because fertile women require such low blood-lead levels, no feasible lead standard could possibly protect them, and that any standard that did so protect them would keep virtually all workers out of the workplace. 54424/1.

OSHA responded to these criticisms in two fundamental ways. First, it rejected LIA's implied assumption that lead poses much greater harm to the reproductive capacities of women than men, marshalling evidence that occupational lead harms the reproductive capacity of males also, and the chromosomes of both sexes. Second, OSHA justified a blood-lead level of 40 ug/100g as being capable of protecting fertile women if supplemented by other provisions of the lead standard.

OSHA found evidence that lead-exposed males suffer serious harm to their spermatogenesis, including malformed sperm (teratospermia), decreased motility of sperm (asthenospermia), and decreased number of sperm (hypospermia). The chief study was that of the European neuroendocrinologist Dr. Lancranjan, whose work revealed adverse effects of spermatogenesis among lead-exposed workers with blood-lead levels as low as 41 ug/100g. JA 1606. A group of workers with a mean blood-lead level of 74.5 ug/100g showed significantly elevated teratospermia; of this group, three fourths suffered hypofertility and half were in fact infertile. Another group with a mean blood level of 52.8 ug/100g showed hypospermia and asthenospermia, as did another group with a mean of 41 ug/100g. Dr. Lancranjan's work found some confirmation in a Mt. Sinai survey of 153 lead

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[96] We find OSHA's contention that it has statutory authority to protect the fetuses of lead-exposed working mothers unassailable. Harm to fetuses, as OSHA contends, is a material impairment of the reproductive systems of the parents. 54423/1.

smelter workers, which revealed unusually high rates of fetal and newborn mortality in the children of these men. JA 2060. Older studies found alarmingly high rates of spontaneous abortion, miscarriage, stillbirth, and birth defects in the pregnancies of women married to lead-exposed workers. *E.g.*, SA 725 (Oliver).[97] Other studies found serious chromosomal abnormalities among lead-exposed workers. *E.g.*, SA 514 (Forni).

OSHA thus found abundant support for the view expressed by experts from NIOSH and the American Health Foundation that a lead standard must protect the reproductive capacities of males as well as females. SA 727 (Infante), 832 (Stellman). Dr. Jeanne Stellman, Chief of Occupational Health Toxicology at AHF, indeed testified that

> there is still no justification for treating women separately from men. The blood level that would probably prevent adverse effects on spermatogenesis is comparable to the level probably necessary to prevent adverse fetal development.

SA 839-840. *See* SA 791 (Hunt), 803 (Hricko).

On the basis of all this evidence, OSHA generally agreed with Dr. Lancranjan's recommendation of a blood-lead level goal of 30 ug/100g. JA 105. Because such a level might be infeasible, however, OSHA decided that a level of 40 ug/100g would be sufficiently protective, concluding that other protective measures in the lead standard would compensate for any harm a difference of 10 ug/100g in maximum blood levels might cause. These

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[97] OSHA also had before it studies on the harmful effects of lead on the reproductive systems of animals. SA 528 (Varma), 724 (Hilderbrand, Muro). The plurality in the benzene case approved such animal studies as a means of proving "significant harm" under § 3(8). *Industrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra* note 54, 48 U.S. L. WEEK at 5035 n.64.

include the 30 ug/100g action level, education and training of workers planning families, careful use of medical surveillance, and the possibility of special precautions—even respirators—under the medical examination provisions of the medical removal program, Section 1910.1025 (k) (1) (iv) ; 54423/2-3.

LIA had essentially argued that only the reproductive functions of women were threatened at low blood-lead levels, and that the only feasible means of protecting fertile women was to exclude them from the workplace or to counsel them out on a case-by-case basis. SA 1504. OSHA has advanced substantial evidence to show that its goal of 40 ug/100g—the same level which it presents as a feasible and necessary one to prevent the other health effects of lead—can in fact protect women from reproductive harm, and, moreover, that men require similar protection.

LIA's challenge on this issue comes down then to an attack on the scientific accuracy of OSHA's studies—especially the Lancranjan study. Most of LIA's arguments against the Lancranjan study had their source in work by Dr. Zielhuis of Amsterdam who, though he found the study less than "conclusive," nevertheless called it "indicative." JA 1645. Moreover, Dr. Lancranjan herself had responded to these criticisms on the record, SA 1353, and OSHA carefully explained why it was rejecting them, 54392/1-54393/1. Thus, while Dr. Zielhuis and LIA complained that Dr. Lancranjan failed to match control groups properly and allowed subject groups distinguished by blood and enzyme levels to overlap, Dr. Lancranjan responded that the controls were matched for the crucial factors of age and mean age, and that the division of groups followed conventional toxicological parameters. 54392/2. While LIA complained of Dr. Lancranjan's failure to allow for the greater physical burden of work—and hence for the possibly reduced sexual

stimulus—of the lead workers as compared to the control group, OSHA explained in response that the lead-exposed workers included office workers and technicians whose work did not impose on them an undue physical burden, 54392/2. In response to LIA's criticism that Dr. Lancranjan had failed to ensure that the workers had abstained from sexual activity—as the experiment required—Dr. Lancranjan noted that any such failure could not possibly have affected her findings on increased teratospermia. JA 106. We have then, at worst, the ordinary situation of controverted evidence, in which we must defer to the reasonable and conscientious interpretations of the agency.

5. *Summary.* OSHA amassed significant evidence that clinical symptoms of lead poisoning arise at blood-lead levels below 80 ug/100g. Nevertheless, OSHA's case for a blood-lead level goal of 40 ug/100g ultimately rests on its theory of subclinical effects. We find substantial evidence for that theory. In 1972 the National Academy of Sciences stated that lead poisoning often may begin with "insidious" biochemical changes imperceptible to the worker, yet portending serious lead disease. JA 1778. Dr. Bridbord of NIOSH described the development of lead disease as a "continuum of a spectrum of response" in which he posited five stages: normal, physiological change of uncertain significance, pathopsychological change (closely associated with disease but perhaps not disease in itself), morbidity, and mortality. JA 304-305. Since subclinical effects arising near 40 ug/100g fall into the third of these stages, Dr. Bridbord recommended that level as OSHA's goal. The majority of physicians testifying at the rulemaking agreed that OSHA should design its standard to prevent the subclinical effects of lead, and that 40 ug/100g was an appropriate blood-lead goal for such a standard. *E.g.*, JA 73-77 (Teitelbaum), 88 (Piomelli), 209-210, 216-217 (Needleman), 195-196 (Epstein).

Some of the studies on which OSHA relied suggested that harmful subclinical effects of lead arise at blood-lead levels lower than 80 ug/100g, but higher than 40 ug/100g. On the other hand, OSHA had evidence that some such effects, such as harm to the reproductive system, may begin below 30 ug/100g, and others, such as heme synthesis inhibition, may begin at levels as low as 10 ug/100g.[98] OSHA set a goal of 40 ug/100g to provide a reasonable margin of safety against effects that might arise at higher levels, while also recognizing that the demands of feasibility prevented it from protecting against all subclinical effects. We must remember that

> [i]n reviewing a numerical standard, we must ask whether the agency's numbers are within a "zone of reasonableness," not whether its numbers are precisely right. * * *

Hercules, Inc. v. EPA, *supra*, 598 F.2d at 106-107; *see Industrial Union Dep't, AFL-CIO v. American Petroleum Institute*, *supra*, 48 U.S. L. WEEK at 5035 (plurality opinion).

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[98] Thus LIA cannot argue that OSHA has exceeded its statutory powers by setting a standard designed to prevent all the effects of lead, as opposed to those leading to material impairment of health. Nor is there merit in LIA's argument that since the upper range of blood-lead levels among the general American population is 40 ug/100g, people not exposed to occupational sources of lead, especially older people, would be suffering ill effects from lead. LIA's point is apparently that OSHA is trying to make the workplace safer than the rest of the world. But the great majority of people in the general population, of course, have blood-lead levels near the mean of less than 20 ug/100g, JA 536-537 (Cole). Moreover, the fact that some people in the general population have blood-lead levels at or near OSHA's intended maximum hardly undermines the logic of OSHA's standard. Such people may well be suffering serious lead effects, but protecting them is the task of other agencies.

D. *Air-Blood Correlation*

LIA contends that even if OSHA were correct in setting a blood-lead level goal of 40 ug/100g, the agency had no basis for setting a maximum workplace air-lead level of 50 ug/m^3 as a means of achieving the blood-lead level goal. LIA's contention raises two issues: (1) whether OSHA should, as a matter of safety and health policy, enforce compliance with the lead standard by requiring environmental monitoring, rather than relying solely on direct biological monitoring of employees; and (2) even if air-lead monitoring is theoretically *preferable*, whether it is scientifically *possible*.

We have little trouble answering the first question in OSHA's favor. The Eighth Circuit has already recognized that though biological monitoring is of course crucial for determining harm to the individual worker, it serves best as a supplement to a general prophylactic scheme carried out through air-lead monitoring. *American Smelting & Refining Co. v. OSHRC*, 501 F.2d 504, 514-515 (8th Cir. 1974). The court found sole reliance on biological monitoring inefficient and unsound, since it might require frequent transfers of workers to low-exposure workplaces within a plant, and since it disclosed high-level exposure while doing nothing to prevent it.

In this proceeding OSHA has convincingly reinforced the Eighth Circuit's view. It has explained that biological monitoring alone would give workers insufficient protection, because excessive lead exposure that threatens long-run harm to workers might not manifest itself immediately in excessive blood-lead levels. 52971/2. OSHA has also concluded that placing the entire burden of compliance on the bodies of workers rather than on the machinery of employers would be unfair, since employers might fire employees with high blood-lead levels as a means of avoiding citations, and unreliable, since such

a program would depend far too much on the contingencies of worker cooperation with medical surveillance. 52971/3.[99]

We therefore uphold OSHA's conclusion that the lead standard should attempt to prevent excessive lead exposure at its source by measuring air-lead levels. The difficult question is whether this sound policy has a scientific basis—whether the agency can draw a rational correlation between air-lead levels and blood-lead levels. The conflicting evidence on this issue is probably the most technically complex in the entire record, combining esoteric medical principles with highly theoretical mathematical analysis. But a conflict in evidence is precisely what emerges from our examination of the issue, and, given the conflict, we must defer to the agency.

We begin by noting that OSHA has never made any pretense of establishing an exact correlation between air-lead and blood-lead measurements, nor does this court have any reason to require one. Having affirmed OSHA's decision that environmental monitoring is the preferable means of enforcing the standard, we recognize that OSHA had to carry out this decision on the basis of the best available evidence, and that in an area of scientific uncertainty the agency has broad discretion to form the best *possible* solution, *Industrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra*, 48 U.S. L. WEEK at 5035 (plurality opinion); *id.* at 5037-5038 (Powell, J., concurring); *Industrial Union Dep't, AFL-CIO v. Hodgson, supra*, 499 F.2d at 474-475 n.18. OSHA and its chief consultants on this issue, Ashford and CPA, have always accepted the view that there is no simple single relationship between air-lead and blood-lead measurements, but have found rather a complex *series*

[99] The Preamble summarizes the great amount of record evidence in support of reliance on environmental monitoring. 54432-54437.

of relationships. 54410/2. Because of the great variations in physiology, personal hygiene, and work habits among individual workers, no formula can readily predict an individual worker's blood-lead level from the air-lead level in his workplace. Rather, OSHA asserts that the CPA formula can generally predict the *distribution* of blood-lead levels within a given worker population in response to changing air-lead levels. And specifically, CPA determined that at an air-lead level of 50 ug/m^3, as older, long-tenured workers with higher blood-lead levels give way to younger workers with low blood-lead levels, the distribution of blood-lead levels will approach an *equilibrium* at which the great majority of workers will have blood-lead levels of 40 ug/100g and below. 54427/2.[100]

OSHA had before it a number of studies which, as LIA reminds us, suggest the impracticality of drawing a useful correlation between air-lead and blood-lead levels. JA 1537 (Williams), 2208 (Delco-Remy); SA 1293 (Globe-Union); JA 2128 (Manchester-King). We agree with LIA that because of the enormous variations in the physiology and personal habits of workers, these studies uncover such great variations in workers' blood-lead levels at any given air-lead level that they cast doubt on the possibility of predicting the former on the basis of the latter. The studies do show a statistical relationship between mean blood-lead levels and mean air-lead levels for large groups of workers. We agree, however, with LIA—and with OSHA, 54409/2—that these correlations are so small as to suggest that a

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[100] In *Ethyl Corp. v. EPA, supra* note 7, 541 F.2d at 42, we upheld the agency's reliance on studies showing a correlation between air-lead and blood-lead levels. However, the agency's statutory task there was not to use those studies as a basis for a precise PEL, but only to demonstrate that airborne lead significantly contributed to bodily absorption of lead.

dramatic reduction in air-lead levels might produce a very undramatic decrease in blood-lead levels. Moreover, no two of the correlation coefficients generated by the studies are alike, JA 2481-2483 (CPA), so once again these studies afford little hope of a single reliable formula. Nevertheless, we agree with OSHA that the inability of these studies to generate such a single correlation formula does not destroy OSHA's theory of a rational correlation between air-lead and blood-lead levels. Rather, it suggests the superiority of the CPA model on which OSHA's theory rests.

OSHA found some conventional flaws in the methods employed by these studies. In particular, it found that the Delco-Remy study may have committed a fundamental error by taking only a single air-lead measure and allowing a 30-day gap between its air-lead and blood-lead measurements. 54403/3. But OSHA's most important criticism of these studies is that they ignored two crucial factors that affect blood-lead levels at a given air-lead level: the length of job tenure and hence the accumulated lead body burden of the sampled workers, and the distribution of particle sizes in the sampled air. 54401/3. The failure to account for job tenure was the most serious flaw in these studies. As OSHA demonstrated in support of its choice of 40 ug/100g as its blood-lead level goal, a great deal of evidence suggests that during continuous exposure to lead the lead levels in some organs of the body increase slowly and inexorably. *See, e.g.*, Part V-C-3 *supra*. Thus a study attempting to predict blood-lead levels on the basis of air-lead levels without accounting for variations in job tenure would overpredict blood-lead levels for newer workers and underpredict levels for long-tenure workers. 54402/1. It is thus no surprise that most of the "snapshot" studies in the record failed to generate reliable correlation coefficients. 54409/3. OSHA chose to rely on the CPA analysis precisely because CPA deliberately accounted

for these factors, while incorporating the data from these other studies.

Relying on a physiological model developed by S. R. Bernard, JA 2469, CPA attempted to describe the response of blood-lead levels to air-lead exposure by examining the dynamics of blood lead transport and metabolism in relation to the duration of lead exposure and the physical properties of airborne lead particulates. Exh. 439; *see* 54405/1. CPA also used the data generated by the other correlation studies to account for the wide variations in individual workers' responses to air lead. Bernard constructed a model called "reference man," incorporating data on physiological transfer rates obtained from measurements of retention and excretion of lead in dogs, rats, baboons, and humans. "Reference man" is divided into five biological compartments—blood, bone, liver, kidneys, and soft tissue. Bernard sought to describe the rates of exchange of lead between the blood and the other compartments, assuming that the rate of exchange was different for each compartment but that each was in accord with the general linear principles of kinetic transfer across inert membranes. 54405/2; SA 2102-2103 (World Health Organization). Each compartment will contain a pool of lead whose size is determined by that compartment's rate of absorption and release, which is in turn affected by whether the particular organ takes up or metabolizes lead. CPA concluded that it could use the Bernard model to generate a series of exponential retention equations to predict the amount of lead that a given initial dose will leave in each compartment after a given amount of time. 54405/2.

To apply the Bernard model to the problem of setting an occupational PEL, CPA had to make several assumptions. OSHA stated its belief that such forthright assumptions, based on empirical observations, were more appropriate than the *implicit* assumptions about particle

size and the effect of tenure on blood-lead levels made by the other studies. 54405/3.

(1) Relying on findings about blood-lead levels in typical urban areas, CPA assumed that workers enter lead-exposed jobs with an average blood-lead level of 19 ug/100g. Exh. 439 at 3-7.

(2) Relying on similar findings, CPA assumed that workers absorb an average of 35.2 ug of lead each day from nonoccupational sources. *Id.* at 3-8.

(3) To allow for differences in particle size, CPA made what has become known in the rulemaking as Assumption "C." CPA observed that at low exposure levels most airborne lead consists of small particles, that the number of large particles increases as the exposure level rises, and that particle absorption decreases as particle size increases. Attempting the best possible fit of theory and data, CPA postulated that all of the first 12.5 ug/m^3 of airborne lead in workplaces will consist of small particles that are absorbed with an efficiency of 37 percent, and that all airborne lead beyond that figure will consist of large particles that are absorbed with an efficiency of eight percent. *Id.* at 4-17.

(4) Finally, relying on data from the Williams and Delco-Remy studies, CPA posed several assumptions about variability of individual blood levels: (a) the average standard deviation among the blood-lead levels of a group of workers of a given job tenure is 9.5 ug/100g; (b) the distribution of blood-lead levels within such a population is normal rather than log-normal; and (c) all the variability is due to differences in individual physiology and habits rather than to measurement errors. *Id.* at 3-15.

Combining these assumptions with the Bernard model, CPA was able to predict the distribution of blood-lead levels at equilibrium for a given air-lead level. 54430,

Fig. 2. CPA concluded that with a PEL of 50 ug/m³, at equilibrium, 0.5 percent of worker blood-lead levels will exceed 60 ug/100g, 5.5 percent will lie between 50 and 60 ug/100g, and 23.3 percent will lie between 40 and 50 ug/100g; thus, 70.7 percent of all exposed workers will have blood-lead levels at or below the goal of 40 ug/100g. 54412/2. OSHA believes that, given the constraints of economic and technological feasibility, this distribution reasonably approximates the goal of eliminating the demonstrably harmful clinical effects and the potentially harmful subclinical effects of lead exposure.

LIA attacks CPA's analysis for flaws in the underlying Bernard model, the changes in the model, and the assumptions CPA had to make in applying the model to the problem of setting a PEL. We find that in each instance OSHA has done a reasonable job of responding to the criticism with further analysis or supporting evidence.

First, LIA charges that the Bernard model is unreliable because it is based on a single experiment—with baboons. But OSHA properly noted that Bernard also drew on data from experiments with other animals and with humans. 54410/2. Second, LIA contends that whereas Bernard's human model contained 106 milligrams of blood, the CPA "reference man" contained 120 milligrams. Dr. Hattis of CPA explained that the difference was due to the presence of pools of blood in human organs that did not exchange, JA 1241, and this view was consistent with OSHA's explanation that some organs specifically sequester lead. 54405/2.

LIA next attacks CPA's assumption that workers begin with a base of nonoccupationally-induced blood-lead of 19 ug/100g. LIA has drawn two different inferences from its own analysis of the Bernard model, first concluding during the rulemaking that the model was based on a starting level of 8.6 ug/100g, then in this appeal

pointing to a figure of 34.4 ug/100g, but in any event stressing the discrepancy between CPA's and Bernard's figures. OSHA explains that LIA's inferences derive from a misunderstanding of the concept of "compartments" in the Bernard model. It asserts that LIA confused the notion of an actual pool of blood in a particular organ with that of an experimental amount based on a hypothetical dose of lead and then affected by the rate of transfer of a particular organ. 54410/3. CPA was thus concerned with a "pool" equivalent in size to the amount of lead from the experimental dose retained by a particular organ, rather than with any specified starting blood-lead level.

LIA also, of course, attacked Assumption "C" as arbitrary and unfounded. CPA has always stressed that Assumption "C" is a postulate that cannot be empirically verified with absolute precision, but OSHA has presented evidence generally supporting the notion of an inverse relationship between the density of airborne lead and particle size. SA 2031 (Addendum to CPA Report); Exh. 234(22) (King-Manchester study). Moreover, OSHA has responded to LIA's assertion that the King-Manchester study contracts Assumption "C" by noting a significant flaw in that study—its failure to analyze the simultaneous effect of particle size and total particulate lead on blood-lead levels. 54404/1. We accept OSHA's view that though Assumption "C" does not agree exactly with any one air-blood correlation produced by any of the record studies, it is a reasonable hypothesis on which to base a formula in an area where absolute precision is impossible.

LIA also proffers studies to refute CPA's belief that physiological transfer rates are linear. *See* JA 2493-2494 (Cole's list of references). OSHA, however, found that at least two of these studies, those by Azar and Prpic-Majic, actually support the linear hypothesis, that

two others, by Hammond and Sanders, really do not address the question of linearity but nevertheless produce results consistent with the linear hypothesis, and that the one study that does contradict the hypothesis, that by Goyer, was expressly rejected by CPA because it was based on a very short-term experiment involving extremely high lead dosages in rats and so bore little relevance to occupational lead exposure. JA 2512 (CPA).

Perhaps LIA's strongest challenge on this issue is to the agency's alleged assumption that blood-lead levels never reach equilibrium and that job tenure and body burden must therefore enter the air-blood calculations. This challenge, however, apparently confounds two types of equilibrium—individual and group. As it has demonstrated on other issues, *e.g.*, 54402/1, OSHA found record evidence to suggest that an individual worker's blood-lead level never reaches true equilibrium. The CPA analysis did predict, however, that the *distribution* of blood-lead levels within a given worker population will reach equilibrium as newer "unleaded" workers replace older workers with large body burdens of lead. Moreover, though LIA never clearly articulated this challenge in the rulemaking and so OSHA never had an opportunity to respond to it directly, ample record evidence supports OSHA's dual theories of equilibrium. The original Bernard study, JA 2469, and other evidence, SA 2102 (World Health Organization); JA 63-64 (Bridbord), demonstrate that a specific blood-lead level maintained over time will create an ever-increasing storehouse of lead within the body, though the rate of increase lessens while the slow-exchanging compartments are filled and the fast-exchanging compartments excrete lead back into the bloodstream. This evidence of individual blood-lead instability contrasts with CPA's finding, through use of the Bernard model, that a stable distribution of blood-lead levels within a population does

emerge as new workers replace old and the given plant achieves compliance with the PEL. Exh. 439, chap. 4.[101]

For a final example, we note that one industry party, St. Joe Minerals Corporation, argues that CPA's assumption of a standard deviation of 9.5 ug/100g was too low to account for measurement error and short-term individual variability of physiological response to lead. We think, however, that CPA reasonably addressed and allowed for this possibility in finding that the Delco-Remy and Williams data supported its assumption. Exh. 439 at 3-14. Moreover, OSHA has exhaustively analyzed the mathematical bases for this assumption. 54407/2-54409/1.

We have examined LIA's major criticisms of the CPA analysis and OSHA's responses to these criticisms. The briefs and rulemaking record reveal further fairly esoteric points of disagreement. But LIA's challenges continue to turn our attention to the legal principle that undoes those challenges: Where the agency presents scientifically respectable evidence which the petitioner can continually dispute with rival and, we will assume, equally respectable evidence, the court must not second-guess the particular way the agency chooses to weigh the conflicting evidence or resolve the dispute.

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[101] OSHA noted that most of the record studies of occupational lead exposure could not possibly have generated useful air-blood correlations precisely because they failed to account for job tenure and body burden. For example, the respected Manchester-King study did not take account of the fact that the sampled workers there had been exposed to lead over 200 ug/m^3 for over two years. This failure would logically result in overpredicting the blood-lead levels of newly-exposed workers, and indeed OSHA found that the Manchester results would lead to a prediction of an average blood-lead level over 40 ug/100g for people with *no* occupational exposure to lead—a figure well out of line with accepted data on normal human lead levels.

As with OSHA's choice of a blood-lead level goal, so with its choice of a PEL, we affirm the agency's chosen number as lying within a "zone of reasonableness." *Hercules, Inc. v. EPA, supra,* 598 F.2d at 106-107.

VI. Feasibility—Defining the Standard

The feasibility issue illustrates better than any other in this case the difficulty both court and agency face in working under very general statutory language.[102] Section 6(b)(5) of the OSH Act simply says that the agency

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[102] LIA argued in its brief that as part of its economic analysis OSHA must undertake formal cost-benefit analysis to ensure that the costs of the new standard bear a reasonable relation to the benefits the standard would yield. However, in the cotton dust case, *AFL-CIO v. Marshall, supra* note 54, we squarely held that nothing in the statute requires such an analysis, and that in fact cost-benefit analysis would contravene the congressional goal of protecting worker health and safety within the limits of economic possibility. —— F.2d at ——, slip op. at 51-59. In *American Petroleum Institute v. OSHA, supra* note 84, the Fifth Circuit took the opposite view of this question, but in affirming the Fifth Circuit's judgment, *Industrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra* note 54, the Supreme Court expressed no view on the cost-benefit question. The plurality took the view that because OSHA's benzene standard did not pass the threshold test of "significant health risk" pursuant to § 3(8) of the statute, the Court had no need to consider in that case the question whether OSHA must also prove a reasonable correlation between the costs and benefits of a new standard. 48 U.S. L. Week at 5024. Only Justice Powell went on record as finding such a requirement in § 3(8), while Justice Rehnquist and the four dissenting Justices concluded that § 3(8) imposed no general check on OSHA's standardsetting discretion at all. *See* note 84 *supra.* The Court, however, will address the cost-benefit question anew. *Republic Steel Corp. v. OSHA,* 577 F.2d 825 (3d Cir. 1978), *cert. granted,* —— U.S. ——, 48 U.S. L. Week 3851 (June 24, 1980); *American Iron & Steel Institute v. OSHA, supra* note 50.

is to set a standard which best protects workers "to the extent feasible," and that "feasibility" must be a factor in any choice of a standard. 29 U.S.C. § 655(b)(5) (1976). On this crucial matter, which in this case was the subject of thousands of pages of record evidence and comments and testimony from 150 parties, Congress has said no more. The conventional arts of statutory construction are of little help in understanding such scant language, especially where the legislative history is virtually silent.[103] What guidance we have in our examination of the feasibility of the lead standard comes from two sources: judicial glosses on "feasibility," and OSHA's fairly detailed explanation of its approach to feasibility in the Preamble to the lead standard.

A. *Judicial Interpretation*

1. *The meaning of feasibility.* The judicial history at least establishes clearly that there are two types of feasibility—technological and economic. *American Iron &*

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[103] We have little beyond Senator Javits' remark, in his separate statement appended to the Senate Committee report on the OSHA bill:

> As a result of this amendment the Secretary, in setting standards, is expressly required to consider feasibility of proposed standards. This is an improvement over the Daniels bill, which might be interpreted to require absolute health and safety in all cases, regardless of feasibility, and the Administration bill, which contains no criteria for standards at all.

S. Rep. No. 91-1282, *supra* note 65, at 58, *reprinted in Legis. Hist., supra* note 22, at 197. The word "feasible," as it finally appears in § 6(b)(5), was placed there at the urging of Senator Dominick, but the opinions in *Industrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra* note 54, are greatly divided and ultimately inconclusive on the significance of the final language. *See* 48 U.S. L. WEEK at 5033 n.53 (plurality opinion); *id.* at 5041 & n.4 (Rehnquist, J., concurring); *id.* at 5045 & n.8 (Marshall, J., dissenting).

Steel Institute v. OSHA, 577 F.2d 825, 832 (3d Cir. 1978), *cert. granted*, —— U.S. ——, 48 U.S. L. WEEK 3851 (June 24, 1980).[104] And the cases in this circuit and other circuits generate some useful criteria for measuring both technological and economic feasibility. But the factual complexity of the record in this case demands that we pursue the meaning of feasibility further than have most earlier courts. Moreover, as we shall discuss in detail below, unprecedented language in the "Means of Compliance" section of the lead standard —establishing an express presumption that the standard is feasible without resort to respirators—creates new problems in determining the feasibility of this standard. We believe, however, that our analysis of this language may ultimately illuminate the meaning of feasibility for OSHA standards generally.

The oft-stated view of technological feasibility under the OSH Act is that Congress meant the statute to be "technology-forcing." *AFL-CIO v. Brennan*, 530 F.2d 109, 121 (3d Cir. 1975). This view means, at the very least, that OSHA can impose a standard which only the most technologically advanced plants in an industry have been able to achieve—even if only in some of their operations some of the time. *American Iron & Steel Institute v. OSHA*, *supra*, 577 F.2d at 832-835. But under this view OSHA can also force industry to develop and diffuse new technology. *Society of Plastics Industries, Inc. v. OSHA*, 509 F.2d 1301, 1309 (2d Cir.), *cert. denied*, 421 U.S. 992 (1975). At least where the agency gives industry a reasonable time to develop new technology, OSHA is not bound to the technological status quo. *Id.* So long as it presents substantial evidence that companies acting vigorously and in good faith can develop the

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[104] OSHA must in any event prepare economic impact analyses of proposed regulations. Executive Order No. 11821, 3 C.F.R. 926 (1971-75 compilation).

technology, OSHA can require industry to meet PEL's never attained anywhere.[105]

The most useful general judicial criteria for economic feasibility come from Judge McGowan's opinion in *Industrial Union Dep't, AFL-CIO v. Hodgson, supra.* A standard is not infeasible simply because it is financially burdensome, 499 F.2d at 478, or even because it threatens the survival of some companies within an industry:

> Nor does the concept of economic feasibility necessarily guarantee the continued existence of individual employers. It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and is consequently financially unable to comply with new standards as quickly as other employers. * * *

Id. (footnote omitted).[106] A standard is feasible if it does not threaten "massive dislocation" to, *AFL-CIO v.*

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[105] In *American Iron & Steel Institute v. OSHA, supra* note 50, 577 F.2d at 838, the court held that OSHA had acted beyond its statutory power in explicitly and affirmatively requiring industry to perform research and development of an undefined nature and quantity. But the court there made clear that OSHA could set a standard that will require technology still only on the scientific horizon, *id.*, and which would thus likely require research and development as a practical matter.

[106] Although many employers in all industries have demonstrated an exemplary degree of concern for health and safety in the workplace, their efforts are too often undercut by those who are not so concerned. Moreover, the fact is that many employers—particularly smaller ones—simply cannot make the necessary investment in health and safety, and survive competitively, unless all are compelled to do so. The competitive disadvantage of the more conscientious employer is especially evident where there is a long period between exposure to a

Brennan, supra, 530 F.2d at 123, or imperil the existence of, *American Iron & Steel Institute v. OSHA, supra*, 577 F.2d at 836, the industry.[107] No matter how initially frightening the projected total or annual costs of compliance appear, a court must examine those costs in relation to the financial health and profitability of the industry and the likely effect of such costs on unit consumer prices. *Id.* More specifically, *Industrial Union Dep't, AFL-CIO v. Hodgson, supra*, teaches us that the practical question is whether the standard threatens the competitive stability of an industry, 499 F.2d at 478, or whether any intra-industry or inter-industry discrimination in the standard might wreck such stability or lead to undue concentration. *Id.* at 478, 481. Granting companies reasonable time to comply with new PEL's might not only enhance economic feasibility generally, but, where the agency makes compliance deadlines uniform for competing segments of industry, can also prevent such injury to competition. *Id.* at 479-481.[108]

> hazard and manifestation of an illness. In such instances a particular employer has no economic incentive to invest in current precautions, not even in the reduction of workmen's compensation costs, because he will seldom have to pay for the consequences of his own neglect.

S. Rep. No. 91-1282, *supra* note 65, at 4, *reprinted in Legis. Hist., supra* note 22, at 144.

[107] The Third Circuit has even hinted that OSHA could find a hazardous industrial activity of such insignificant redeeming social utility that it could absolutely ban the activity where there was no technologically feasible means of abating the hazard. *AFL-CIO v. Brennan*, 530 F.2d 109, 121 (3d Cir. 1975).

[108] The Preamble to the lead standard shows that OSHA carefully considered the dangers of destroying competition. 54476/2. At one point OSHA expressed doubt that destruction of "subgroups" of an industry that threatens the industry's competitive structure might not make a standard

2. *Proving feasibility.* Having this general guidance on the *meaning* of feasibility, we still need to know how OSHA is to *prove* feasibility. Within the rather generous constraints of the substantial evidence test, and given our necessary deference to the agency when it is making an essentially legislative decision, *see* Part II *supra*, we must decide what to require of OSHA in the matter of types and quantity of data, precision of cost estimates, and certainty of prediction. On this question the cases offer some modest help.

As for technological feasibility, we know that we cannot require of OSHA anything like certainty. Since "technology-forcing" assumes the agency will make highly speculative projections about future technology, a standard is obviously not infeasible solely because OSHA has no hard evidence to show that the standard has been met. More to the point here, we cannot require OSHA to prove with any certainty that industry will be able to develop the necessary technology, or even to identify the single technological means by which it expects industry to meet the PEL. OSHA can force employers to invest all reasonable faith in their own capacity for technological innovation, *Society of Plastics Industries, Inc. v. OSHA*, *supra*, 509 F.2d at 1309, and can thereby shift to industry some of the burden of choosing the best strategy for compliance. OSHA's duty is to show that modern technology has at least conceived some industrial strategies or devices which are likely to be capable of meeting the PEL and which the industries are generally capable of adopting.

Our view finds support in the statutory requirement that OSHA act according to the "best *available* evidence." 29 U.S.C. § 655(b)(5) (1976) (emphasis added). OSHA

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infeasible, 54474/2, but since it never relied on this rationale in finding the standard feasible for any industry we need not consider its validity.

cannot let workers suffer while it awaits the Godot of scientific certainty. It can and must make reasonable predictions on the basis of "credible sources of information," whether data from existing plants or expert testimony. *AFL-CIO v. Marshall, supra,* —— F.2d at ——, slip opinion at 41-42; *see Industrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra,* 48 U.S. L. WEEK at 5035 (plurality opinion). Our role is to ensure that the agency has developed substantial evidence in meeting that task.

The ironic truth is that "technology-forcing" makes the agency's standard of proof somewhat circular. Since the agency must hazard some predictions about experimental technology, it may not be able to determine the success of new means of compliance until industry implements them. *Society of Plastics Industries, Inc. v. OSHA, supra,* 509 F.2d at 1309 (citing OSHA's explanation of the vinyl chloride standard). Conversely, OSHA or the courts may discover that a standard is infeasible only after industry has exerted all good faith efforts to comply. *Atlantic & Gulf Stevedores, Inc. v. OSHRC, supra,* 534 F.2d at 550. Both the agency, in issuing, and the court, in upholding, a standard under this principle obviously run the risk that an apparently feasible standard will prove technologically impossible in the future. But, while we will address below the complexities of this issue, we note the general agreement in the courts that such flexible devices as variance proceedings can correct erroneous predictions about feasibility when the error manifests itself, and thus can reduce this risk. *E.g., Society of Plastics Industries, Inc. v. OSHA, supra,* 509 F.2d at 1310.

Proving economic feasibility presents different problems. We know from the cotton dust case that OSHA need not specifically weigh industry costs against worker benefits. *See* note 90 *supra.* But when the agency has

proved technological feasibility by making reasonable predictions about experimental means of compliance, the court probably cannot expect hard and precise estimates of costs. 54479/2.[109] Nevertheless, the agency must of course provide a reasonable assessment of the likely range of costs of its standard, and the likely effects of those costs on the industry. The practical question is what form that assessment must take.

The one case to address this question in some detail is the cotton dust decision. Judge Bazelon clearly implied that the agency need not engage in massive data collection with its own staff, but can rely on data and estimates produced by consultants and even the industries themselves. OSHA, in effect, can then produce its "own" estimate by modifying the consultants' or industries' estimates where it finds specific faults in their calculations. More important, OSHA can correct such "double-counting" errors as failing to allow for investment tax credits or productivity benefits from new control devices, or neglecting to consider the cost advantages of installing new machines instead of "retrofitting" old equipment, or including in its sums compliance costs for firms that were already in substantial compliance with the new standard on their own initiative and so would incur no new costs. *AFL-CIO v. Marshall, supra,* —— F.2d at ——, slip opinion at 44-45. And OSHA can revise any gloomy forecast that estimated costs will imperil an industry by allowing for the industry's demonstrated ability to pass through costs to consumers. *Id.*, —— F.2d at ——, slip opinion at 49.[110]

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[109] In the cotton dust decision Judge Bazelon also noted that an agency will inevitably have difficulty achieving precise cost estimates when it must depend on often recalcitrant industry sources for much of its data. *AFL-CIO v. Marshall, supra* note 54, —— F.2d at ——, slip op. at 48.

[110] The cotton dust decision does bar OSHA from one means of revising outside estimates: OSHA cannot act in

In relying on such revised estimates, however, OSHA must do more than generally allege that the independent estimate is too high. Rather, it must carefully identify the sources and assess the magnitude of any over-estimation. *Id.*, —— F.2d at ——, ——, slip opinion at 70-71, 74. Thus, though OSHA must answer an allegedly wrong estimate with a counter-estimate, the counter-estimate need not derive from new data. OSHA can work from the outside party's data and estimates, so long as it is thorough and precise in explaining its revisions. *Id.*, —— F.2d ——, slip opinion at 72. In short, the agency can rely on the best available evidence, *id.*, —— F.2d at ——, slip opinion at 74, and the court demands only substantial evidence.[111] "We do not require the agency to establish the standard's economic feasibility in a particular way." *Id.*, —— F.2d at —— n.228, slip opinion at 75 n.228.

B. *The Circularity Problem*

Despite these useful guidelines, the cases have left one very serious and elusive ambiguity at the heart of the feasibility question, an ambiguity highlighted—or exacerbated—by a new twist OSHA has placed in the "Means of Compliance" section of the new lead standard. The problem is essentially that we cannot know if a standard

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circular fashion by subtracting from the total cost of the standard the costs of compliance of those firms which are likely to go out of business precisely because they cannot afford these costs. *Id.*, —— F.2d at —— n.219, slip op. at 72 n.219.

[111] Where, as in some industries under the lead standard, OSHA must rely on data supplied by industry sources which fail to distinguish the likely costs of the new lead standard itself from the costs of overlapping regulations, we cannot expect OSHA to be terribly precise in measuring the effect of double-counting. *See* 54494/2. It must assess those effects as best it can given the available state of the data.

is feasible until we know exactly what it expects of employers, and to the extent that we find OSHA's rules to be less demanding than they would otherwise appear, we may find it easier to accept them as feasible. There should be a clear line between construing the precise terms of the demands OSHA places on industry and assessing the feasibility of those demands. But some of the cases have blurred this line. They have justified their deference to OSHA's feasibility findings, at least in part, by discovering flexibility in OSHA's regulatory scheme that renders the standards less stringent than they may first appear. These apparently very reasonable decisions, however, do not address a serious analytic problem in the standards.

For example, two cases, in upholding OSHA standards as feasible, have pointed to the availability of variance proceedings as means by which companies can gain relief from standards which prove too demanding. *American Iron & Steel Institute v. OSHA*, *supra*, 577 F.2d at 835; *Society of Plastics Industries, Inc. v. OSHA*, *supra*, 509 F.2d at 1310.[112] And at least one court has noted that even if industry cannot find the technology to meet the PEL, OSHA has simply required companies to install new engineering controls and work practices "to the extent feasible," and allowed them to use respirators to meet the PEL when feasible engineering and work practice controls prove insufficient to meet the PEL by themselves. *Id.*

The reference these courts make to variances glosses over important details in the OSH Act. The statute

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[112] The Second Circuit misstated the issue somewhat by speaking of "amendments" to standards available under 29 U.S.C. § 655(b)(6)(A) (1976), which is in fact the temporary variance provision. *Society of Plastics Industries, Inc. v. OSHA*, 509 F.2d 1301, 1310 (2d Cir.), *cert. denied*, 421 U.S. 992 (1975).

speaks of variances in two sections. In 29 U.S.C. § 655 (d) (1976) the statute describes what are in effect "permanent variances." These variances from a standard, however, are only available to employers whose workplaces "are as safe and healthful as those which would prevail if [they] complied with the standard." *Id.* These variances are therefore useless to the employer who claims that he can find no practical way of meeting the health and safety demands of an OSHA standard, assuming, of course, that OSHA does not find respirators as "safe and healthful" as engineering and work practice controls. Indeed, these variances seem generally irrelevant to the whole scheme of the lead standard. Section 655(d) seems to contemplate a standard that requires employers to use particular means of compliance to meet a health or safety goal; the section would allow employers to find an alternate route to the same goal. The lead standard, by contrast, essentially leaves the choice of particular engineering controls or work practices to the employer, and simply specifies the goal—the PEL.[113]

The other type of statutory variance, essentially a "temporary variance," [114] derives from 29 U.S.C. § 655

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[113] OSHA has argued in its brief that a permanent variance from the lead standard may be available to at least one industry—telecommunications. OSHA brief at 246. We need not address that argument now, since this industry is one of those for which we remand the question of feasibility. *See* Part IX *infra*.

[114] The parties—even including OSHA—have enhanced the confusion over the variance issue by referring to what can only be temporary variances as "abatement proceedings"—a term which appears nowhere in the statute. We also note one minor and very special form of variance under the statute: OSHA, without any express restrictions, can grant a variance from any standard to permit an employer to participate in an experiment designed by OSHA or HEW to test new safety or health controls. 29 U.S.C. § 655(b)(6)(C) (1976).

(b) (6) (A) (1976). If an employer cannot comply with a standard by its effective date "because of unavailability of professional or technical personnel or of materials and equipment * * * or because necessary construction or alteration of facilities cannot be completed by the effective date," *id.*, he may obtain temporary relief from compliance. This section appears to grant some relief at least to the employer who is technologically incapable of meeting a standard.[115] The problem, of course, is that such a variance is *very* temporary. Relief is generally for no more than one year, though some employers may obtain renewals that could effectively extend the variance to three years.[116] These variances may suffice for many employers claiming infeasibility. But OSHA's predictions about feasibility may turn out to be so faulty as to make even three years' relief insufficient. In any event, the temporary variance hardly seems designed to relieve an entire industry—as opposed to an isolated employer—of a standard which the industry appears unable *ever* to meet.

The Second Circuit's reassuring reference to the provision in the vinyl chloride standard allowing employers to rely on respirators when "feasible" engineering and work practice controls prove inadequate to meet the PEL, *Society of Plastics Industries, Inc. v. OSHA*,

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[115] OSHA construes the legislative history of the statute as barring claims of economic hardship as grounds for temporary variances. 54508/3 n.8.

[116] LIA argues that the maximum statutory length of a temporary variance, including renewals, is two years. Though the statutory language may leave some doubt, we believe LIA misreads it. Under 29 U.S.C. § 655 (b) (6) (A) (1976) a variance can be as long as one year when necessary, and may be renewed twice. The statute does say that no *interim* order of renewal can last more than 180 days, but the 180-day limit does not appear to apply to a non-interim renewal granted after a hearing.

supra, 509 F.2d at 1310, also glosses over problems in determining OSHA's burden of proving feasibility. Assuming, as we probably can in the present case, that the PEL is feasible so long as the employer can rely on respirators when the best possible engineering and work practice controls prove insufficient,[117] a court should have no trouble finding an OSHA standard feasible if, in somewhat circular fashion, the employer need use only those non-respirator controls which are feasible. But the Second Circuit never considered the potential circularity in this scheme. If employers need only use those engineering and work practice controls which prove feasible, what meaning is there in the statutory requirement of feasibility? How can such a standard ever be infeasible?

The cases have apparently assumed that there *is* some meaning to the feasibility test—that it does not suffer a fatal logical flaw. In this assumption, as we shall see, they are doubtless right, but their failure to address the problem has left us somewhat rudderless in approaching the great difficulty of the feasibility question in the present case. Similarly, the cases are ultimately right in their assumption that procedures in the OSHA regulatory scheme giving employers relief from impractical standards reduce OSHA's burden of proof on feasibility. But the cases have never carefully considered the range and significance of these procedures.[118] We find it neces-

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[117] LIA nowhere seriously contends that respirators cannot reduce the lead level in the air workers breathe below 50 ug/m^3, or that the industries cannot afford these respirators.

[118] The Third Circuit has indeed analyzed OSHA *enforcement* proceedings in some detail. *Atlantic & Gulf Stevedores v. OSHA*, 534 F.2d 541 (3d Cir. 1976). But it offered that analysis in considering an appeal from an enforcement proceeding. The enforcement proceeding has received no judicial attention in the context of a general pre-enforcement

sary to examine both these matters, not just because this rulemaking is so complex, but also because the industry parties here have directed our attention to language in the lead standard different from that of all previous standards which, the industry argues, demonstrates that the lead standard is significantly more stringent than all earlier standards, and so harder to prove feasible. We believe the industry is right in focusing on this language, but we conclude, after what we hope will be clarifying analysis, that the difference is ultimately in emphasis, not substance.

C. *Resolving the Circularity*

1. *Construing the earlier standards.* Every earlier OSHA standard restricting toxic substances that has created a hierarchy among preferred means of compliance has by its terms built the very concept of feasibility into the standard. The cotton dust standard is typical. It requires employers to meet the PEL solely through engineering and work practice controls "except to the extent that the employer establishes that such controls are not feasible." 29 C.F.R. § 1910.1043(e)(1)(1979). Where "feasible engineering and work practice controls" cannot achieve the PEL, the employer may and must use respirators to make up the difference, though he must continue to use engineering and work practice controls to reduce exposure as well as they can. *Id.* § 1910.1043(e)(2); *see id.* § 1910.1043(f)(1)(iii).

The feasibility test for a standard that only expects feasible improvements from employers may appear circular. But reasonable construction of such a standard avoids circularity. The cases have apparently treated these standards as creating a general *presumption* of fea-

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review of an entire standard, where the court would be able to consider the effect of the future availability of a feasibility defense in such a proceeding on the *initial* feasibility decision.

sibility for an industry. A company could not simply refuse to pursue engineering or work practice controls by asserting their infeasibility. Rather, it would have to attempt to install controls to the limits of contemporary technical knowledge and of its own financial resources. Judicial review of feasibility would have some meaning, because the court would have to find substantial evidence to justify this presumption—evidence that the technical knowledge to meet the PEL without relying on respirators was available or would likely be available when deadlines arrive, and that enough firms could afford to so meet the PEL that the market structure of the industry would survive. Thus the court would do a preliminary test of feasibility on any pre-enforcement challenge to the rulemaking.

But the court always reserves the power to test feasibility again later—in reviewing denial of a temporary variance or, where an employer found such a variance insufficient, in judicial review of an enforcement proceeding under 29 U.S.C. § 659 (1976). In the temporary variance proceeding the employer could of course argue that the standard was infeasible for his company in particular—at least at the effective date of the standard. But in an enforcement proceeding the employer could also expect the agency and court to entertain the affirmative defense that the standard had proved *generally* infeasible—even if the court had earlier found otherwise on pre-enforcement review. In any of these proceedings, of course, the employer would bear the burden of proof.[119]

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[119] Because the financial incapacity of a single firm to meet the PEL cannot normally prove a standard infeasible, presumably an employer could only raise a defense of *technological* infeasibility in an enforcement proceeding. Indeed, one OSHA standard, the asbestos standard, generally allows respirators only where engineering and work practice controls prove "technically" infeasible. 29 C.F.R. § 1910.1001-

Thus, since the presumption of feasibility remains rebuttable, in pre-enforcement review the court would not expect OSHA to prove the standard *certainly* feasible for *all* firms at *all* times in *all* jobs. But it would have to justify the presumption, and the attendant shift in burden, with reasonable technological and economic evidence and analysis. Assuming this construction of the earlier standards is correct, the question is whether any of it changes under the lead standard.

2. *The lead standard.* The key change is in the following provision in the lead standard:

> (e) *Methods of compliance*—(1) *Engineering and work practice controls.* The employer shall implement engineering and work practice controls (including administrative controls) to reduce and maintain employee exposure to lead in accordance with the implementation schedule in Table I below. Failure

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(d)(ii) (1979). On the other hand, an employer could attempt to defend against an enforcement citation by showing, through his particular circumstances, that a standard is *generally* economically infeasible. *See Atlantic & Gulf Stevedores v. OSHA*, *supra* note 118, 534 F.2d at 555.

The dissent takes the view that in shifting the burden of proving infeasibility to the employer in such later proceedings, the agency has acted inconsistently with the recent plurality opinion in *Industrial Union Dep't, AFL-CIO v. American Petroleum Institute*, *supra* note 54. We note, however, that Justice Stevens' opinion in that case spoke of OSHA's evidentiary burden only in the context of the § 3(8) requirement that the agency find "significant risk of harm," *see* text at note 91 *supra*, and was not dealing with the agency's responsibilities under § 6(b)(5), the source of the feasibility requirement. In any event, we think it consistent with *American Petroleum Institute* that OSHA bear the initial burden of proving the general feasibility of the standard for the industry as a whole at the rulemaking stage, shifting to the employer in later proceedings the task of overcoming OSHA's initial finding.

> to achieve exposure levels without regard to respirators is sufficient to establish a violation of this provision.

Section 1910.1025(e).[120] This section does not, like the earlier standards, incorporate feasibility into the rules for means of compliance. Rather, it appears to declare the standard and timetable feasible without regard to respirators, and thus announces any failure to meet the PEL by engineering and work practice controls alone a violation of the standard.

Without much reference to the earlier standards, LIA invokes the language of Section 1910.1025(e)(1) to argue that the lead standard is especially unyielding, and hence subject to especially strict review for feasibility. LIA construes the standard as absolutely prohibiting employers from relying on respirators to meet the PEL after the phase-in dates, and LIA therefore argues that OSHA must prove the feasibility of the PEL for all workplaces in all industries, at least within the boundaries of the standard as slightly extended by the availability of temporary variances. Indeed, LIA emphasizes how slight that extension is, noting that temporary variances are very limited in duration, shift the burden of proof on feasibility to the employer, and are generally ill-designed to give relief from industry-wide infeasibility. Finally, LIA suggests the irony that, under its view of the severity of the standard, the standard invalidates itself on the feasibility question, since at several points in the Preamble OSHA concedes that employers will not

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[120] On the other hand, the lead standard provisions explaining when employers may use respirators are virtually identical to the parallel provisions in the earlier standards, requiring respirators whenever engineering and work practice controls cannot reduce air-lead levels to the PEL. Section 1910.1025(e)(2), (f).

be able to meet the PEL in some operations. *E.g.*, 54482/2 (maintenance work in primary smelters).[121]

OSHA has not been terribly successful in explaining, or explaining away, the striking new language in Section 1910.1025(e)(1). However, its partial explanations in the Preamble convince us that LIA, though correct in identifying this problem, has exaggerated its significance. In the Preamble OSHA explains its deletion of the word "feasible" from the "Methods of Compliance" rules in the lead standard by asserting that it has already determined the standard to be feasible without regard to respirators. 52991/1. It goes on to state that the intent of this deletion was to preclude individual employers from raising and proving the defense of infeasibility in enforcement proceedings. *Id.* Elsewhere in the Preamble, however, OSHA suggests that post-enforcement claims of infeasibility "can be better dealt with through enforcement activities where solutions can be worked out by affected parties." 54479/2; *see* 54476/3. Moreover, the Preamble significantly, if ambiguously, qualifies the "violation" language of Section 1910.1025 (e)(1) by stating that failure to meet the implementation schedule without relying on respirators will establish "a *prima facie* violation of paragraph (e)(1)." 52991/1 (emphasis added). And, though its examples seem to limit such relief to very special cases of unexpected "process upsets" in a plant or unusual jobs performed in inaccessible or non-predeterminable places, *id.*, OSHA has expressly stated that employers will at least have the opportunity in some sort of post-enforcement proceeding to prove the standard infeasible in particular instances.

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[121] As we note later, such concessions, where limited to a few operations in an industry where the PEL is nevertheless feasible, do not render the standard infeasible for that industry.

Thus OSHA's express construction of its standard suggests that, in substance, its rules on methods of compliance are essentially the same as those in earlier standards: The lead standard, like the earlier standards as apparently construed by the courts, may offer employers a number of means of relief from impractical demands, and so may not require the stringent test of feasibility for which LIA argues. OSHA counsel reiterated this view during oral argument, stating that employers could at least raise claims of particular instances of infeasibility in enforcement proceedings. Transcript of oral argument at 97. More important, with respect to post-enforcement claims that the standard is generally infeasible for an industry, OSHA counsel insisted that OSHA would never attempt to enforce an impossible standard, and noted that where such problems have arisen under the Clean Air Act, either EPA or Congress has seen to it that the law respects reality. *Id.* at 100-101.[122] Finally, counsel reiterated the view that the lead standard does not in substance change OSHA's position on methods of compliance and the feasibility thereof, equating the lead standard with earlier standards on the matter and stating that "[a]ll that this arrangement in this standard does is formulate or formally phrase what has always been the Secretary's philosophy of compliance." *Id.* at 107.

We thus conclude that the OSHA standards issued under 29 U.S.C. § 655 (1976) have been implicitly consistent on the question of feasibility of means of compliance and relief from impractical standards. And we now attempt briefly to supply the systematic analysis of this question which has not been forthcoming from either OSHA or earlier cases.

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[122] *Compare Union Electric Co. v. EPA*, 427 U.S. 246, 268 (1976).

When affected parties petition for pre-enforcement review of an OSHA standard, the standard must pass a preliminary test of general feasibility. First, within the limits of the best available evidence, and subject to the court's search for substantial evidence, OSHA must prove a reasonable possibility that the typical firm will be able to develop and install engineering and work practice controls that can meet the PEL in most of its operations. OSHA can do so by pointing to technology that is either already in use or has been conceived and is reasonably capable of experimental refinement and distribution within the standard's deadlines. The effect of such proof is to establish a presumption that industry can meet the PEL without relying on respirators, a presumption which firms will have to overcome to obtain relief in any secondary inquiry into feasibility in any of the proceedings we discuss below. Insufficient proof of technological feasibility for a few isolated operations within an industry, or even OSHA's concession that respirators will be necessary in a few such operations, will not undermine this general presumption in favor of feasibility. Rather, in such operations firms will remain responsible for installing engineering and work practice controls to the extent feasible, and for using them to reduce lead exposure as far as these controls can do so. In any proceeding to obtain relief from an impractical standard for such operations, however, the insufficient proof or conceded lack of proof will *reduce* the strength of the presumption a firm will have to overcome in justifying its use of respirators.

Second, as for economic feasibility, OSHA must construct a reasonable estimate of compliance costs and demonstrate a reasonable likelihood that these costs will not threaten the existence or competitive structure of an industry, even if it does portend disaster for some marginal firms. To protect industry from the risk of wasteful guesses about the best means of compliance, we can

also expect OSHA to show that new technology, even if it might fall short of meeting the PEL, will nevertheless significantly reduce lead exposure.[123]

Such a standard of review for feasibility, of course, in no way ensures that all companies at all times and in all jobs can meet OSHA's demands—and as we have seen, OSHA readily concedes this. Moreover, under a "technology-forcing statute," with proof to a certainty impossible,[124] there always remains the chance that an

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[123] The lead standard also allows employers to "bypass" interim PEL's in their industry timetables. That is, if an employer files a compliance plan describing a strategy to meet the final PEL, and meeting the interim PEL would wastefully divert resources from fulfilling that strategy, OSHA will not cite the employer for exceeding the interim PEL.

[124] Questions involving the environment are particularly prone to uncertainty. Technological man has altered his world in ways never before experienced or anticipated. The health effects of such alterations are often unknown, sometimes unknowable. While a concerned Congress has passed legislation providing for protection of the public health against gross environmental modifications, the regulators entrusted with the enforcement of such laws have not thereby been endowed with a prescience that removes all the doubt from their decisionmaking. Rather, speculation, conflicts in evidence, and theoretical extrapolation typify their every action. How else can they act, given a mandate to protect the public health but only a slight or nonexistent data base from which to draw? * * * Sometimes, of course, relatively certain proof of danger or harm from such modifications can readily be found. But, more commonly, "reasonable medical concerns" and theory long precede certainty. Yet the statutes—and common sense—demand regulatory action to prevent harm, even if the regulator is less than certain that harm is otherwise inevitable.

Undoubtedly, certainty is the scientific ideal—to the extent that even science can be certain of its truth. But certainty in the complexities of environmental medicine

OSHA standard, after appearing generally feasible on review of the rulemaking, will ultimately prove generally infeasible. But we present this standard of review in the reassuring context of a scheme of devices by which employers can gain relief from such problems in the future, and by all of which devices employers can revert to respirators as a means of compliance when engineering and work practice controls prove insufficient.

First, for employers who need as much as three years to meet the deadline in the standard, the temporary variance proceeding remains available, along with judicial review of the denial of a variance. Second, an employer who is cited for failing to meet the standard in a particular operation, and who believes the standard has proved technologically infeasible for that operation, can claim this "specific" infeasibility as a defense in an enforcement proceeding. *See Marshall v. West Point Pepperell, Inc.*, 588 F.2d 979 (5th Cir. 1979). Thus an OSHA standard remains subject to a second test of feasibility with respect to special difficulties in certain operations.[125]

But OSHA may also face a second test of feasibility even on a claim that the standard is *generally* infeasible for *an entire industry*. First, we see nothing to prevent an employer from raising a defense in an enforcement proceeding that the standard has proved infeasible for all similar companies—not just for his own. The alleged infeasibility may be technological, if the firm is typical or

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> may be achievable only after the fact, when scientists have the opportunity for leisurely and isolated scrutiny of an entire mechanism. * * *

Ethyl Corp. v. EPA, supra note 7, 541 F.2d at 24-25 (footnotes omitted).

[125] An employer's right to challenge the feasibility of a standard in an enforcement proceeding appears to be implicit in the statutory scheme. *Atlantic & Gulf Stevedores v. OSHA, supra* note 118, 534 F.2d at 548-550.

is large enough to prove that it has made all possible efforts to develop engineering or work practice controls to meet the PEL. Or it might be economic, where the defending firm can use its own experience to prove that no employer could afford to meet the standard, *see Atlantic & Gulf Stevedores v. OSHA*, *supra*, 534 F.2d at 555, or prove that its own demise would wreck the competitive structure of the industry.

Second, where employers believe that a standard originally determined to be feasible had proved infeasible, they could petition the agency to initiate a new rulemaking to revise the standard. 29 U.S.C. § 655(b) (1976); *compare AFL-CIO v. Brennan*, *supra*, 530 F.2d at 120. Of course, if no law assures the employers that OSHA will start a new rulemaking or even take their petitions seriously, a realistic prediction that the agency will nevertheless do so cannot, as a legal matter, affect our review at this stage. But where time does demonstrate the infeasibility of a standard once approved as feasible, so that the very predicate for the original rule and its statutory basis have disappeared, a court may well be able to deny the agency any discretion to refuse a new rulemaking. *Geller v. FCC*, 610 F.8d 973, 978-980 (D.C. Cir. 1979) (*per curiam*); *see* S. Doc. No. 248, 79th Cong., 2d Sess. 201-202 (1946).

Thus we reject LIA's unyielding reading of the standard, though we concede its superficial foundation in the regulatory language. There is no hard rule of *res judicata* or estoppel barring employers from obtaining relief from a standard which time proves impossible to meet. And so while our test for feasibility cannot be lamely deferential, the possibility of reexamination of the question, and the assurance that employers will be able to rely on respirators if OSHA's predictions about engineering and work practice controls prove too sanguine, greatly ease OSHA's preliminary burden in proving

feasibility. So long as we require OSHA to show that any required means of compliance, even if it carries no guarantee of meeting the PEL, will substantially lower airlead exposure, we can uphold OSHA's determination that every firm must exploit all possible means to meet the standard.

VII. The Feasibility of the Lead Standard

A. *OSHA's General Approach*

Having established these general principles for analyzing feasibility, we must proceed to consider the particular problems OSHA faced in determining the feasibility of the lead standard, and to explain the particular approach it devised for doing so. Our introductory analysis of feasibility has already been lengthy, and this next phase of our analysis makes it still lengthier. Since OSHA, however, developed a fairly consistent method for analyzing feasibility, explaining this method in some detail at the outset will not only illuminate our discussion of particular industries, but will also obviate the need for exhaustive summary of OSHA's factual findings in each of the many industries affected by the standard.

From the start OSHA faced a difficult task in merely gathering information on the great number of industries potentially affected by the standard. It worked from a basic list of 46 such industries, Exh. 22 at 21-25, representing 70,000 workplaces and 5.3 million exposed workers. From these 46 industries it chose six for extensive data-gathering and analysis—primary smelters, secondary smelters, battery-making, nonferrous foundries, pigment manufacturers, and printing. However, OSHA's first consultant, John Short & Associates, studied economic and technological feasibility for all 46 industries, subcontracting economic analysis of the costs of compliance to DBA. The Short Report, designated as a Preliminary Economic Impact Statement, was issued to the public in January 1977.

Dissatisfied with the quality of the Short Report,[126] OSHA then hired DBA to do a follow-up study of feasibility, for part of which DBA subcontracted with Arvil Adams Associates to perform economic analysis. Exh. 26. Of the original 46 industries, DBA selected 17 for further data collection, and did extensive study of five of the six industries originally emphasized by Short: primary smelters, secondary smelters, battery makers, pigment manufacturers, and nonferrous foundries. As for the 12 remaining industries which it studied,[127] DBA did a moderate amount of data collection on auto manufacturing and shipbuilding, and more limited research on the others, often relying heavily on the Short Report. Exh. 65B. In preparing what became the official Economic Impact Statement for the lead standard, DBA, of course, incorporated Short's data and analysis for the 29-odd industries DBA itself did not study.[128]

The DBA report was issued in February 1977, just before the hearings began on the lead standard. Parties representing 22 of the affected industries participated directly in the hearings on the feasibility issue. That

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[126] *See* Part VII-B-8 *infra.*

[127] These included: ship manufacture, auto manufacture, solder manufacture, electronics, gray iron foundries, wire patenting, paint manufacture, wallpaper manufacture, ink and dye manufacture, can manufacture, pottery, and printing. For a fuller discussion of the research the consultants performed on the nonmajor industries, *see* Part VII-B-8 *infra.*

[128] DBA also relied on data and analyses prepared by other consultants, including Charles River Associates (CRA), Exh. 127; Industrial Health Engineering Associates, Inc. (IHE), Exh. 29, 29A, 138D, 3(108); and the Center for Policy Alternatives (CPA), Exh. 439A-C. Since the first two of these consultants were hired by industry parties, DBA's data rely in significant part on industry sources. OSHA very carefully explained all apparent discrepancies among the estimates these consultants prepared for the same industries. 54495/2-54496/2.

issue generated thousands of pages of record evidence, derived from the testimony or comments of 150 parties.

In its Preamble explanation of the standard OSHA thoroughly described its approach to analyzing feasibility. Relying on ample judicial authority for examining feasibility with respect to particular industries and the general capacity of each to comply, *e.g.*, *Industrial Union Dep't, AFL-CIO v. Hodgson*, *supra*, 499 F.2d at 478, the Secretary outlined the criteria it used in determining such feasibility: (1) The general innovativeness of the industry; (2) the financial and technical resources available to the industry; (3) the degree of change needed and its stage of development; (4) the certainty of the product market; (5) the size and complexity of the plant or process requiring change; and (6) the experience of recent technological change in similar industries. 54475/2-3.

In measuring technological feasibility for the great majority of affected industries, OSHA found that the exposure levels in these industries were sufficiently low that very simple engineering and work practice controls could meet the PEL. 54493/3. For the five major industries OSHA acknowledged the need for major technological change, attributing much of the problem to the fact that these industries had generally never attempted even basic controls. OSHA thus adopted a strategy of "reasonable 'planning horizons.'" 54479/1. It left the choice of the best particular techniques to industry, while setting reasonable timetables to allow firms to make and carry out that choice.

For the major industries generally OSHA relied heavily on the technical testimony of a very few experts—most notably Dr. Melvin First of the Harvard School of Public Health, who testified that a "total control" strategy of engineering and work practice controls, including crucial and basic controls which much of industry had never attempted, would make the PEL feasible.

54476/3-54479/2. We discuss this testimony in detail when we address the feasibility of the primary smelters, but we note here that Dr. First described this strategy very thoroughly.

In measuring economic feasibility for the many low-exposure industries, OSHA states that it inferred from its consultants' reports an estimate of $118.4 million in capital costs and $84.5 million in annual costs, which would mean costs per exposed employee of $188 and $134 respectively. OSHA asserts that it received no evidence whatever that these industries could not afford these costs. 54508/1.

OSHA, of course, does not pretend to have achieved strictly accurate estimates for the five major industries, where its need to force experimental technology and to leave the choice of means to industry makes such a goal quixotic. But it nevertheless constructed estimates out of the various industry and consultants' reports. For each major industry DBA offered "low," "high," and "best" estimates. 54495/2. The low estimate for each industry relies on the lowest per-employee and per-ton of production cost found in any plant in the industry multiplied by the number of employees and tons of production in the industry. The high estimate similarly relies on the highest per-employee and per-ton cost for any plant in the industry. For the primary smelters DBA created its "best" estimate by simply aggregating the estimates for each plant. Individual plant estimates were not available in the other four major industries, so DBA created its "best" estimate for those by finding the geometric mean of the costs per employee and per ton for each plant in its limited sample. *E.g.*, Exh. 26 at 5-40.

OSHA, however, claims that DBA's "best" estimates were really equivalent to "high" estimates because DBA, like the other estimators, frequently engaged in improper double-counting. OSHA's concept of double-counting is

the chief basis of its critique and revision of the proffered estimates. Such critique and revision, as we noted earlier, must be specific and well explained to survive court review, *AFL-CIO v. Marshall, supra,* —— F.2d at ——, slip opinion at 71-74, and we assess OSHA's success in this regard later when we consider OSHA's revised estimate for particular industries. But we note here that OSHA has been fairly thorough in the Preamble in identifying the sources of such double-counting generally in the proffered estimates.

First, OSHA found that DBA had considerably overcounted by including in the costs of the lead standard the overlapping costs of other federal and state regulations, including other OSHA standards, 54494/2, and DBA apparently conceded that the aggregate estimates supplied by industry sources on which it frequently had to rely failed to exclude these overlapping costs. Second, OSHA objected to DBA including in the cost of the new lead standard the costs that intransigent firms have yet to expend in meeting the old and more generous PEL of 200 ug/m^3. 54494/3-54495/1.[129] On both these questions OSHA's point is that the feasibility of the cost of the lead standard should depend only on the cost of the lead standard itself. OSHA asserts, however, that it nevertheless accounted for these related expenses by incorporating them in its analysis of the general economics of the industry. 54494/1. Moreover, OSHA asserts that DBA failed to subtract from compliance costs the value of the increased productivity from new control devices

[129] DBA conceded this inclusion, but asserted that isolating the costs of the lead standard alone was practically impossible. Exh. 26, 4-10-11. OSHA apparently believes, nevertheless, that it must attempt the task as well as it can. DBA's statement however, leads us to lighten somewhat OSHA's burden, under *AFL-CIO v. Marshall, supra* note 54, —— F.2d at ——, slip op. at 71-74, *see* text accompanying note 99 *supra,* to identify any alleged double-counting with great specificity.

that favorably alter production equipment, 54495/1, and the value of accelerated depreciation and investment tax credits for new control equipment, 54495/1-2. Finally—and this will prove crucial in the major industries—OSHA found that the consultants often failed to assess the ability of industry to survive even massive compliance costs by passing them through to consumers.[130]

Revising available estimates by these means, OSHA attempted to predict the costs of the standard to each major industry in terms of capital expenses—the costs of new engineering controls and hygiene facilities—and annual expenses—the costs of monitoring, medical surveillance, recordkeeping, medical removal, meeting respirator and hygiene standards, protecting and maintaining equipment, and depreciation and interest expenses.

The difficulty of measuring all these complex elements of feasibility, and perhaps also the difficulty of obtaining accurate information from the industry itself, left OSHA with a very limited data base for many specific feasibility questions. And LIA's attack on the sufficiency of that data base amounts to its strongest attack on any part of the lead standard, especially since LIA blames OSHA itself for not developing enough information on feasibility. On the less important lead industries, LIA argues that OSHA relied on a document—the Short Re-

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[130] Two other principles of revision merit note. First, especially because many companies admitted they feared revealing confidential information to the agency and their competitors, OSHA had reason to suspect the accuracy of any data derived from industry sources and presumed some overestimation. 54495/1. Second, OSHA excluded from the costs of compliance expenditures already made by companies who were in voluntary pre-standard compliance with the PEL, once again because the test of economic feasibility looks to the costs incurred as a result of the issuance of the new standard. 54493/3.

port—which the agency itself conceded to be unreliable. On the more important industries, LIA contends that OSHA marshalled insufficient information to counter what it claims to be clear statements in the DBA report that even the 100 ug/m³ standard might be infeasible [131] —though LIA does not effectively answer OSHA's analysis of consistent double-counting in DBA's economic findings.

But most important, on all the industries LIA argues that since OSHA never gave notice that the final PEL would be 50 ug/m³ rather than the proposed 100 ug/m³, and since OSHA never released its consultants' post-hearing report on the feasibility of this lower PEL, virtually all the evidence developed at the rulemaking concerned the higher PEL. In our earlier discussion of alleged procedural flaws in the rulemaking we addressed the strict procedural legality of OSHA's setting the final PEL at 50 ug/m³ when the rulemaking was chiefly directed at the higher proposed PEL. Here, our concern is to apply the substantial evidence test to determine whether evidence chiefly directed to the higher proposed PEL can logically, if indirectly, support the feasibility of a lower final PEL. LIA, of course, argues that OSHA cannot prove the feasibility of the final PEL by this means. But we believe there is nothing *inherently* invalid about such means of proof. The question is always one of reasonable inferences from the available facts about a particular industry. We thus see no point in deciding, as a matter of substantial evidence, whether research directed to a higher standard can *generally* prove the feasibility of a lower standard.

Moreover, regardless of whether OSHA directly invited evidence on the feasibility of the 50 ug/m³ standard, the rulemaking did in fact produce some evidence

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[131] *E.g.*, Exh. 26 at 1-2, 6-16; JA 1651.

on at least the technological feasibility of the lower PEL. Thus, industrial hygiene engineer Maier Schneider expressly testified that proper engineering and work practice controls would reduce lead exposure in lead processing and handling even below 50 ug/m³, JA 335-336, and Dr. Melvin First, on whom OSHA reasonably relied for a comprehensive analysis of proper dust control throughout lead industries, very clearly suggests that once industry sets its mind to adopt such a strategy it could achieve incredibly low levels of air-lead exposure. JA 403. As for economic feasibility, OSHA concedes that its cost estimates generally derived from data on the likely expenses of the 100 ug/m³ standard. However, given the speculative technology on which it could ask industry to rely, and the difficulty in obtaining accurate cost data from industry, it was not necessarily wrong for OSHA to conclude that attempting to extend the highly speculative "guesstimates" on the costs of the 100 ug/m³ standard to account for the incremental costs of the lower standard would produce very diminishing analytic returns.[132] Rather, where OSHA found that industry and consultants' estimates for the higher PEL were overstated because of double-counting, and where their economic analyses failed to account for the ability of healthy industry to absorb great costs or pass them through to the market, there is nothing inherently invalid about OSHA projecting its determination of the feasibility of a 100 ug/m³ PEL to a well-phased-in 50 ug/m³ PEL.[133]

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[132] Although it does not rely very heavily on this second theory, OSHA also had evidence that reductions in the PEL below 100 ug/m³ were likely to increase compliance costs in a linear rather than an exponential fashion. SA 172-173 (Burton), 1341-1342 (First).

[133] LIA argues that the statutory requirement that OSHA act on the "best available evidence," 29 U.S.C. § 655(b)(5) (1976), means that OSHA had to direct the rulemaking to the

B. *The Evidence for the Industries*

Relying on the judicial guidelines outlined in our introduction and on our summary of OSHA's approach to proving feasibility for the standard generally, we proceed to analyze the proof of feasibility for individual industries. For each industry we discuss technological and economic feasibility separately, and in some of the major industries we address technological feasibility with respect to each of several important operations within the industry. For each industry or operation we assess the substantiality of OSHA's evidence and the cogency of its rationale, and address significant industry criticisms of the agency's findings.[134]

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50 ug/m³ standard. But the "best available evidence" rule, as construed by the recent Supreme Court benzene decision and our cotton dust decision, requires OSHA to act immediately to protect workers as best it can, without waiting for scientific certainty. *Industrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra* note 54, 48 U.S. L. WEEK at 5035 (plurality opinion); *AFL-CIO v. Marshall, supra* note 54, —— F.2d at ——, slip op. at 25. We decline to read this phrase as setting an unprecedented evidentiary burden on the agency—to show not only that its evidence was substantial, but also that its evidence was the best it could possibly have presented.

[134] In the industry-by-industry analysis that follows we make no attempt to summarize in representative detail the extremely copious and complex record evidence on the feasibility issue. Rather, we focus on the strongest evidence OSHA presented for each industry, and the most important counter-evidence or counter-analysis. The public record in the case and the 37-page summary in the Preamble to the standard, 54473-54509, are ample sources for the full range of the evidence in the rulemaking. Citations to the record are generally followed by parentheticals mentioning the name of the witness or commenter. The three exceptions are for the oft-cited Short Report, Exh. 22, and the DBA report, Exh. 26, and its addenda, Exh. 65B.

1. *Primary lead smelting.* The primary lead smelting industry consists of four companies—ASARCO, Inc., St. Joe Minerals Corporation, Bunker Hill Company, and AMAX Lead & Zinc, Inc.—operating seven primary smelting facilities. Exh. 26 at 5-3 to 5-4. The primary lead smelting process consists essentially of sintering (use of the furnace to break down the ore and remove sulfur as sulfur dioxide), smelting (melting), and refining (heating the molten lead to remove impurities). All stages of the smelting process are very dirty and expose workers to high air-lead levels. The OSHA standard recognizes these traditionally high air-lead levels by granting primary smelters the longest phase-in time accorded any industry. Primary smelters must achieve the old PEL of 200 ug/m^3 on the effective date of the standard, 100 ug/m^3 within three years, and 50 ug/m^3 within ten years. The extremely remote deadline at which the primary smelters are to meet the final PEL is perhaps the single most important factor supporting the feasibility of the standard. OSHA's technology-forcing strategy, and its reliance on embryonic schemes for compliance, are particularly reasonable in light of such a generous phase-in period.[185]

a. *Technological feasibility*: Although OSHA had some evidence that the air-lead level was already near 100 ug/m^3 in many areas of the primary smelting industry, Exh. 22 at 130, SA 431 (St. Joe), OSHA generally found that the primary smelters had tolerated high lead levels by relying on respirators, SA 414 (St. Joe), and

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[185] OSHA's legitimate position on technology forcing helps justify its rejection of DBA's doubts about the ability of the industry to meet the 100 ug/m^3 interim standard within the required three years, Exh. 26 at 5-7. Moreover, given our earlier general construction of the feasibility requirement, we agree with OSHA that DBA was wrong in requiring that feasibility be proved for all operations at all times in each industry. 54479/3.

biological monitoring, JA 1337 (AMAX), rather than taking advantage of the most fundamental control devices such as vacuum sweeping and exhaust ventilation, SA 1334 (First). Thus, in finding the standard feasible for primary smelting, OSHA relied heavily on the general principle of technology forcing: Coerced by the standard, the industry would take advantage of the great array of dust control strategies it had ignored, and would use the ten years OSHA had granted it to develop such new controls as those designated for the innovative new hydrometallurgic process, JA 601-632 (Block).

The testimony of perhaps OSHA's single most important witness, Dr. Melvin First of the Harvard School of Public Health, thus became especially relevant to the primary smelters. We summarize it briefly here, but note that Dr. First's comprehensive view of dust control strategy not only applies to most of the operations within the smelting process, but also is residual support for the feasibility of the standard in many of the other industries.

Dr. First testified that virtually any lead operation could be made safe if the employer established physical barriers between workers and emission sources and used exhaust ventilation systems where perfect physical containment is not possible. He stressed that the basic technology for such controls in most stages of lead processing is now available, and underscored the need for rigorous housekeeping and maintenance to protect workers from the residuum of lead dust that inevitably escapes even the best controls. SA 1346-1349. Though Dr. First was extremely specific in delineating the control devices he believed available and essential, 54477/2-3, the important general theme of his testimony is that a proper control strategy does not aim at or settle for partial reductions in lead exposure:

> [W]hen one correctly applies principles of engineering control, an operation or a machine is totally

> controlled. That is to say, when an operation or a machine is properly enclosed, it no longer discharges lead dust to the workroom atmosphere.
>
> * * * *
>
> Therefore, as a practical matter machines and processes are controlled or they are not controlled. There are no way stations on the road to process control. You either do it or you don't. * * *

JA 398-399; *accord*, SA 1797 (Steelworkers); JA 335-336 (Schneider). As a technological matter Dr. First expressed his view that American industry is capable of reaching virtually any low air-lead level at which it aims. JA 403.[136]

OSHA also found great promise in newly conceived experimental control technology for primary smelters, most notably a new hydrometallurgical method for recovering lead from galena concentrate. As described by Dr. Frank Block of the Bureau of Mines, JA 601-632, this process will eliminate the sintering and smelting and possibly even the refining stages of primary lead production, and hydrometallurgical plants will ultimately be cheaper to build than conventional pyrometallurgical plants. The evidence suggests that since this process is both closed and wet it will dramatically reduce lead exposure. Though the project has only been developed on the laboratory scale, OSHA found evidence that a pilot project could be built in three to four years, and thus that the process could be established in the industry within ten years. 54480/2.

Thus, even without regard to problems in specific operations, OSHA had evidence that the standard was generally feasible, as we have earlier defined general feasi-

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[136] Dr. First conceded that a "total control" strategy would still mean significant incremental costs as the PEL goal is lowered, since the lowering of the PEL will require industries to control an increasing number of operations. JA 399.

bility, for the primary lead smelters. We proceed, however, to examine specific operations.

Sintering. A sintering machine is a traveling grate furnace that transfers, breaks, and sizes raw materials to drive off sulfur. It thus produces a great deal of lead dust. DBA found that the *lowest* airborne lead level in any sintering operation was 1,000 ug/m^3, and that the level in one plant was 14,000 ug/m^3. Exh. 26 at 5-10. DBA did not find it technologically feasible to reduce lead exposure in sintering to 100 ug/m^3, but it did recommend the engineering controls that would most effectively reduce lead exposure:

> All belts and material handling systems must be closed and ventilated. Sinter machine feed will require dust control. Enclosure and exhaust will be needed on the updraft section of the machine. An exhausted tunnel enclosure is required on each side of the machine. Sinter breaking and sorting machines will require enclosure and exhaust. All operator stations will require filtered HVAC [high-volume filters].

Exh. 26 at 5-9. Despite DBA's skepticism, OSHA could reasonably infer from Dr. First's more optimistic view of similar strategy and the testimony of others that sintering lead exposure could be reduced to 100 ug/m^3, 54480/3 (Caplan), or even lower, JA 155 (Smith). Though OSHA concedes that this testimony does not go directly to the technological feasibility of the 50 ug/m^3 PEL, it also rightly notes that this testimony describes only conventional and available technology that merely requires retrofitting old machines. Thus OSHA could conclude that the interim PEL of 100 ug/m^3 was easily feasible in three years, and that an additional seven years would likely see advancements in the conventional technology described by Dr. First, or such new technology as that described by Dr. Block (which would eliminate sin-

tering altogether). OSHA realistically conceded that respirators might be necessary as supplements to developing engineering controls in sintering if its projections prove wrong. We find OSHA's projections justified.

Blast furnace. The blast furnace is the primary device for reducing sintered ore into molten slag. The highest air-lead levels occur when employees clear solidified slag or solidified lead from the tuyeres, or air passages, around the furnace. Exposures in the furnaces range from as low as 30 ug/m^3 to as high as 24,000 ug/m^3. Exh. 26 at 5-10. Industry witnesses expressed doubt that such exposure could generally decrease to 100 ug/m^3, 54481/1 (citing testimony). Just as with sintering, DBA expressed doubt that 100 ug/m^3 was a feasible PEL, Exh. 26 at 5-7, but suggested the best possible controls, which, once again, are conventionally available now:

> Adequate topside exhaust hoods will control regular emissions. No proven local exhaust system can adequately control blow holes and other fugitive emissions. Dilution ventilation in the building will be necessary and hooded exhaust systems will be required at tapping areas. Filtered HVAC will be required for operator stations, offices, crane cabs and heavy equipment operator cabs.

Exh. 16 at 5-9. And, once again, we believe that OSHA could approach such recommendations from Dr. First's perspective and predict, given the ten-year phase-in, that these controls might become considerably refined. 54481/2. We think OSHA justified in concluding that, where currently available techniques, according to record evidence, can reduce lead exposure to 100 ug/m^3, ten years of further development can achieve the 50 ug/m^3 goal, especially where supplemental respirator control remains, by OSHA's specific concession, *id.*, available if the next ten years prove OSHA wrong.

Drossing. This process, which is a form of refining, removes from the molten lead a hardened cake-like ma-

terial and transports it to the dross furnace by a large scoop attached to an overhead crane. Exposure levels range from 150 ug/m^3 to 2,000 ug/m^3. Exh. 26 at 5-10. Because emissions in drossing are extremely difficult to control, OSHA has conceded that respirators will likely be necessary to help achieve the PEL unless, presumably, experimental technology develops with great speed. 54481/2. LIA argues that such a concession, based on the absence of specific optimistic evidence, proves the standard technologically infeasible for this operation.

We agree that OHA's concession raises greater doubt about the specific feasibility for this operation than it does for others. But once again, the technology suggested to OSHA as the best possible scheme in this operation, seen in the perspective of the ten-year phase-in and Dr. First's view of technology forcing, does give some credence to OSHA's prediction that the PEL might be met. Thus, Industrial Health Engineering Associates, Inc. consultant Knowlton Caplan, describing such devices as an adapted Trav-L-Vent system, 54481/2, *see* SA 343, and a Berzelius vacuum drossing machine that would involve drossing at a higher temperature, JA 1023, suggested that such technology "ought to be able" to work in drossing, JA 1020; *see* JA 1023. In any event, this is a typical instance of an operation whose capacity to meet the standard is questionable but does not invalidate the feasibility finding for the primary smelters generally.

Refining. The refining process, somewhat similar to drossing, removes antimony and other waste products from molten lead. No one has yet devised a substitute for the ladle for moving materials in this process, and there are limits to employers' ability to reduce fugitive lead emissions for this device. 54481/3. Nevertheless, the striking fact about this operation is that one plant has consistently achieved air-lead levels between 50 ug/m^3 and 100 ug/m^3. Exh. 26 at 5-10. OSHA also found that

much of the technology Caplan suggested for the drossing operation might prove beneficial in refining. The evidence on that technology is in doubt,[137] however, and OSHA's finding that the standard is feasible for refining ultimately rests on the fact that the standard has been virtually met in one plant. That in itself can constitute substantial evidence. *AFL-CIO v. Marshall, supra,* —— F.2d at ——, slip opinion at 42; *American Iron & Steel Institute v. OSHA, supra,* 577 F.2d at 833, 834.

Other operations. Our finding that the standard is generally feasible for the major operations in the primary smelters makes it relatively easy to do so for the minor operations. These include: concentrate handling and storage, where the problem is simply to enclose the handling operation entirely and separate the worker from it, JA 1067 (Godsey), and crane and heavy equipment, which only requires the development of sufficiently powerful air conditioning, JA 1025-1026 (Caplan). Though the evidence on these operations went chiefly to the feasibility of a 100 ug/m^3 PEL, the technology to meet that PEL is currently available, so OSHA could conclude that the industry could achieve 50 ug/m^3 in ten years.[138]

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[137] We must chide OSHA here for greatly exaggerating Knowlton Caplan's optimism about the ability of the Berzelius machine to achieve the PEL in refining. 54481/3; *see* JA 1020.

[138] In two other operations, baghouse and flue dust handling, and maintenance, OSHA has effectively conceded that respirators will likely be necessary, 54482/1-2, though of course these need not change our view of the general feasibility of the standard for the primary smelters. There was evidence, moreover, that the Bergsoe process, which we discuss in detail below when we address secondary smelting, might be useful in flue dust handling in primary smelters. *Id.* As for maintenance, since no one could logically expect industry to always meet the PEL for workers one of whose main tasks will be to maintain and repair the control devices designed to achieve the PEL generally, we believe that OSHA need not prove that industry will not have to rely on respirators in this operation.

b. *Economic feasibility*: Revising estimates from CRA and DBA according to some of the double-counting analysis we described earlier, OSHA estimated the likely capital cost to the primary smelters of reducing lead exposure to 100 ug/m^3 to be between $32 million and $47.2 million (in 1976 dollars). Though precise elimination of double-counting is impossible, OSHA fulfilled its duty to identify the sources and assess the magnitude of such double-counting as well as it could. 54498/1. Specifically, OSHA found that industry and consultant estimates overestimated by about 30 percent by including the costs of meeting EPA and other air quality regulations, added over $2 million to the costs for one firm by including the costs of air quality regulations and failing to note the increased productivity benefits of such costs, and included the considerable costs several ASARCO plants would incur in simply meeting the old 200 ug/m^3 standard. *Id.* OSHA made proportional downward revisions of estimated annual expenditures, since a major part of such costs is the annual charge to capital. *Id.* The speculative nature of the technology industry would likely develop to meet the final PEL of 50 ug/m^3 and the great discretion industry would have in choosing strategies once this technology was developed led OSHA to conclude that it could not make precise estimates for the additional cost of meeting the lower final PEL. While LIA has obviously seized on this alleged flaw in OSHA's proof, the key factor in OSHA's finding of economic feasibility for the primary smelters—the ability of the industry to pass back or pass on the costs of compliance—greatly obviates the problem of OSHA's decision not to attempt to measure these additional costs.

In the Preamble OSHA exhaustively analyzed the economic structure of the industry, the distribution of costs among the four smelting firms, the financial strength of the firms, and their ability to transfer the costs of compliance. 54498/2-54503/1. We need summarize only its

essential conclusions here. Though the primary smelting industry tends to be oligopolistic, competition from secondary smelters and foreign suppliers makes the market relatively competitive. The demand for lead is remarkably inelastic, particularly with respect to the storage battery industry which consumes almost half of all domestically produced lead. Exh. 26 at 6-20; 54499/1 (citing sources and rebutting contrary evidence). OSHA also analyzed conflicting evidence on international supply and demand for lead and concluded that increasing demand, especially demand due to increased use of the automobile and industrialization in developing countries, will likely improve the strength of the domestic primary smelters. 54500/1. OSHA carefully examined the internal financial health of the individual smelting firms, 54500/2-3, and proceeded to address the capacity of these firms to transfer the costs of compliance, emphasizing that DBA's somewhat pessimistic assessment of the economic feasibility of even the proposed 100 ug/m^3 PEL had assumed that these firms would have to absorb all these costs themselves.

OSHA came to several key conclusions. First, the primary smelters would certainly be able to raise the price of refined lead by as much as one cent per pound in order to pass compliance costs to consumers. 54500/3.[139] OSHA attributed its consultants' disagreement on this issue to their failure to recognize the inelasticity of domestic and foreign demand and of foreign supply. 54501/1. OSHA also found support for its analysis in the comments of one producer, AMAX. JA 1339. Thus the smelters could easily pass on the annualized estimated costs of reducing lead exposure to 100ug/m^3—between 0.4 and 0.6 cents per pound. 54498/2. Extending this analysis, OSHA

[139] OSHA also developed some evidence showing that the primary smelters could effectively pass some of the costs of compliance back to the suppliers of ore by lowering the price they pay for such ore. 54501/1.

concluded that the ability to pass through as much as one cent per pound would enable the smelters to survive any additional costs due to meeting the lower final PEL. 54501/2-3. Criticizing a contrary view in the CRA report, OSHA noted that ASARCO, which had claimed to be in financial jeopardy, had recently committed itself to spending nearly $90 million to install environmental controls at two smelters, resulting in a cost increase of 6.2 cents per pound, almost one third of the market price of lead at the time. OSHA concluded that ASARCO's willingness to risk such sums indicated its ability to recover them through price increases or cost passbacks. *Id.* Finally, after examining the financial condition of each smelting firm and allowing for overestimation of costs by the consultants and their consequently gloomier picture of the resilience of these firms, OSHA found that the firms could remain profitable and competitive even if they had to absorb a large part of the costs of compliance. 54501/3-54503/1. The record showed that, if fully absorbed, those costs would represent between 1.7 percent and 15.9 percent of a company's 1976 after-tax profits and roughly 2 percent of the industry's overall profits for that year. SA 1825 (Steelworkers).

In the context of our construction of the feasibility requirement, and subject to the qualifications on technological feasibility, we uphold OSHA's findings of feasibility for the primary smelters.

2. *Secondary lead smelting.* The secondary lead industry recycles scrap metals and discarded products to produce lead. 54882/2-3. Sixty-one percent of the recycled lead comes from used storage batteries and the rest from cable sheathing, linotype, and dust and impurities recovered from lead smelting. Battery plates and terminals normally must be mechanically separated, and lead-copper cables must be heated to melt off the lead.

Any scrap lead containing lead oxide is heated in a blast furnace to reduce the oxide. Finally, all scrap must be smelted to recover crude lead, which then undergoes some form of refining. The secondary smelting process largely resembles primary smelting, but a few differences stand out. First, since secondary plants smelt scrap metal, not ore, the process does not require ore or concentrate handling or sintering. Second, drossing in secondary smelters is simpler because the bullion does not contain corrosive metals. SA 344 (Caplan). Finally, the entire operation tends to be on a smaller scale than that of a primary smelter.

The contours of this industry defy strict definition, estimates of the number of plants ranging from 40 to 140. SA 1177 (IHE). DBA estimated the number of exposed workers to be 4,400, Exh. 26 at 2-13, with the majority of air-lead level samples well over 100 ug/m^3, Exh. 26 at 2-17, 2-18. OSHA concluded that the industry could meet the 100 ug/m^3 standard without respirators within three years and the final PEL within five years.

a. *Technological feasibility*: Knowlton Caplan of IHE told OSHA that the secondary smelters "are tougher than a battery plant to bring into compliance, but easier than a primary smeltor [*sic*]. The main reason being that the secondary smeltor [*sic*] raw material is quite pure lead as compared to what the primary smeltor [*sic*] handles." Addenda to OSHA brief, Addendum D at 14-15 (Transcript at 5750-5751). A good deal of record evidence supports this general optimism about the technological feasibility of the standard for secondary smelters. Dr. Thomas Smith of DBA stated that the 100 ug/m^3 level was feasible for the smelters, JA 153, a view shared by the Steelworkers, JA 392, 395; SA 1659; and reinforced by the report from one firm, Keystone Resources, that it had already achieved an average exposure level of 126 ug/m^3, JA 1295. Caplan suggested that engi-

neering controls alone might be incapable of achieving 100 ug/m^3 in two operations—slag handling and battery breaking, JA 1184—but he did not consider administrative controls as a supplement in those operations. Only one witness, industrial hygienist Meier Schneider, explicitly told OSHA that engineering controls alone could achieve the 50 ug/m^3 level, JA 343, but OSHA had at least two bases for inferring from the record that the final PEL was indeed feasible. First, Michael Varner, head of ASARCO's department of environmental science, and Dr. Melvin First of the Harvard School of Public Health, testified that improvements in conventional control technology, such as continuous vacuum drossing, mobile exhaust hoods, sand seals on refining kettles, and fresh air control rooms, are all applicable to the secondary smelters and would reduce exposures significantly. JA 1068; SA 328-331. Second, and most important, OSHA relied on testimony about the Bergsoe process.

The efficiency and practicality of the Bergsoe process became the crux of the debate over the feasibility of the standard for the secondary smelters in the lead rulemaking. This process for smelting scrap was developed by Svend Bergsoe, president of Paul Bergsoe & Son, Glostrup, Denmark, for his Glostrup plant. Bergsoe himself and Thomas Mackey of Key Metals & Minerals Engineering Corporation described the process at length during the hearing, JA 892-954, and in exhibits, JA 1924, 1936, 1944.

The Bergsoe process mechanizes many of the operations which are performed by hand in American smelters. The battery breaking is done by a machine that punctures the old battery and drains the acid. The batteries are then mixed with coke, iron oxide, iron, limestone, scrap, return slag, and agglomerated flue dust, and then charged by vehicle up along a ramp to the top of a shaft furnace. JA 1924-1925. Almost all the lead and antimony in the

charge is then tapped as crude metal, which is then further refined for removal of tin, copper, and arsenic to produce an almost pure concentrate of tin and antimony. *Id.* An afterburner, of innovative design, then treats the exhaust gases, eliminating the need for tall cooling towers. The afterburner is so efficient that the Landskrona, Sweden plant, which produces 25,000 tons of crude lead per year, requires only a few stacks about ten feet high and produces no smell, noise, or visible smoke. JA 1927. The flue dust, one of the worst hazards in conventional secondary smelters, is flash-agglomerated in a special furnace Bergsoe developed for that purpose, and ends in an easily handled solid form. JA 1932-1934.

The Bergsoe system is expensive. Existing smelters can convert to it only with very great difficulty, so the scheme will generally require rebuilding of plants. But OSHA believes the effort worthwhile. Especially because it eliminates the great pollution hazard inevitable in conventional battery breaking, the Bergsoe system has achieved an air-lead standard of "well below" 100 ug/m^3 in one plant. JA 1935. Though LIA rightly notes that Bergsoe's comments might be colored by a strong commercial interest, neither it nor NARI actually challenges those comments. LIA does, however, attempt to limit the value of Bergsoe's evidence.

First, LIA argues that Bergsoe testified only about the 100 ug/m^3 level, not the 50 ug/m^3 level. That may be true, but OSHA, bound to act on the best available evidence, could draw reasonable inferences from the testimony even where Bergsoe himself did not do so.[140] Berg-

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[140] LIA argues that the Secretary has made too much of Bergsoe's testimony, and that Bergsoe was not in fact testifying in support of a 50 ug/m^3 PEL. In support of this contention it cites a letter written by Bergsoe several months after the regulation's promulgation. In that letter Bergsoe disavows any intent to argue that a 50 ug/m^3 PEL would be

soe suggested that his technology already could come extremely close to the PEL, and OSHA could conclude that this process, improved over the coming years and supplemented by refinements in conventional controls of the sort suggested by Dr. First, could achieve 100 ug/m³ in three years and the final PEL within five years. LIA also charged that the Bergsoe process applied only to smelting, not refining. But Bergsoe himself testified that air-lead could be brought below 100 ug/m³ in refining, as proved by the experience of one plant, JA 933, and in any event OSHA presented evidence for refining, as we will note below, independent of the Bergsoe process. LIA also argues that a single Bergsoe furnace could not provide the types or quantity of lead currently produced by American smelters, and that large firms would therefore have to build two Bergsoe smelters, while the Bergsoe process would be useless for firms producing fewer than 20,000 tons per year. This argument, like LIA's general attack on the expense of the process, essentially goes to the question of economic feasibility. We simply note here that so long as the large smelters can use the Bergsoe process and the smaller smelters have other means of com-

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feasible, and says that he was "a little bit shocked" at the final standard. NARI supplemental brief at 25. OSHA responds, correctly in our view, that the letter is extraneous to the record and that it does not bear on the question whether the Secretary's reading of the record was within his discretion. Moreover, whatever view a witness may take of his or her testimony, OSHA is free, in a proper exercise of its rulemaking functions, to examine the evidence on which the witness' conclusions are based, and to apply its expertise to draw whatever conclusions it deems proper, if they are fairly supportable. Here, we cannot say that OSHA exceeded its authority by concluding that Bergsoe's testimony and expert measurements of lead levels as low as 52 ug/m³ provided additional authority for the feasibility of the PEL.

pliance available, the limits of the Bergsoe system are hardly fatal to the feasibility of the standard.[141]

We conclude that OSHA has made a reasonable general case for the technological feasibility of the standard for the secondary smelters, but we proceed very briefly to address problems in individual operations.

Battery breaking. So long as this operation remains manual, the industry will have difficulty in reducing exposures below 100 ug/m^3. DBA noted rather significantly, however, that the industry has hardly tried at all, never attempting such obvious controls as hoods over saws and guillotines and ventilation around piles. Exh. 26 at 5-31. DBA did suggest that automation and enclosure might achieve the 100 ug/m^3 level, *id.*, and an LIA consultant, Knowlton Caplan of IHE, while expressing some doubt that the 100 ug/m^3 was feasible, did suggest that local exhaust systems for various stages in the breaking process would usefully reduce exposures, JA 1865. Because the sloth of the industry is a major barrier to accurate predictions about these conventional controls, we would be inclined to hold that OSHA had substantial evidence even on the basis of this limited testimony, abetted by that of Dr. First, for its finding that the smelters could meet the final PEL in manual battery breaking within five years. But since this operation is the prime focus of the Bergsoe process, we can rely on Bergsoe in concluding that OSHA had substantial evidence here.

Scrap handling. In this operation, as in battery breaking, DBA found that the industry had so far attempted few controls, most plants doing little more than periodically sweeping open areas where scrap is piled. Exh. 26 at 5-31. Though DBA expressed some doubt whether conven-

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[141] OSHA cited such other conventional means of control suggested by the record as improved housekeeping (First), using steel plate floor surfaces (Caplan), and enclosing and pressurizing front-end loaders (Mackey). 54483/2.

tional controls could reduce exposure to 100 ug/m^3 at this stage, it did recommend basic controls which the industry has apparently never attempted to install: enclosure and ventilation of storage bins, conveyor systems, floor paving and wet sweeping or vacuuming, and isolation of the whole operation to prevent cross-contamination. *Id.* DBA conceded that respirators might be necessary at this stage, *id.*, though OSHA only went so far as to suggest that administrative controls might be needed to supplement engineering controls. 54483/3. OSHA might reasonably have concluded that in five years an industry that had so far attempted almost no controls might be able to solve the problem with conventional devices. But OSHA could, of course, concede the difficulty of meeting the PEL without respirators in this operation without conceding the standard to be infeasible for the industry. More important, this is one of the operations whose exposure problem the Bergsoe process would likely solve.

Blast furnace. This operation produces the most dangerous exposures, air-lead levels currently measuring 500 to 10,000 ug/m^3. Exh. 26 at 5-31. The Bergsoe process, of course, would drastically reduce this exposure, but OSHA had other evidence to conclude that the industry might meet the PEL in five years in the furnace stage. The great number of untried controls recommended by a variety of consultants suggests that OSHA's conclusion is reasonable. Plants currently hood the stay of the furnace, charge the furnace by skip hoist, and hood the lead tap. But workers, normally wearing respirators, now manually load the skip hoist with lead, coke, and limestone. *Id.* OSHA found evidence that substantial automation of the process and control of adjacent sources of emission would keep exposures below 100 ug/m^3. DBA, though doubting that perfect automation of the process was possible, recommended close

hooding to control fumes, extensive use of conveyors, and separating air forced into the chamber from the operator. Exh. 26 at 5-31 to 5-32; *accord*, JA 1866-1867 (IHE); JA 899-900 (Mackey). The uncertainty in this area makes any technological prediction very speculative, but we think OSHA's evidence is sufficient to invoke its legitimate policy of technology forcing. OSHA concedes that respirators may be necessary in some tasks in the blast furnace, 54484/1 but the question remains open enough to warrant a general presumption of feasibility.

Reverbatory furnaces. Some secondary smelters use these furnaces to separate antimony from bullion. The only record evidence on this process is DBA's observation that all charge and tapping points in these furnaces now have hoods, but that the smelters ought to attempt to upgrade the hoods and isolate the whole process. Exh. 26 at 5-32. DBA had no information on current exposure levels. Though LIA argues that this evidence is insufficient, it offers no counter-evidence. This is a relatively minor operation, involving few employees, where the necessity of respirators would not imperil the standard generally. But OSHA could in any event reasonably infer that the chances for meeting the PEL in this operation are at least as good as they are in the blast furnace.

Slag handling. The smelters normally handle slag manually or by payloader in an open area. The slag is tapped into conical molds and, once solid, is broken. Exh. 26 at 5-32. The evidence on feasibility in this operation is very sketchy and uncertain. DBA simply suggested that the operation be enclosed and ventilated. *Id.* An LIA consultant, Knowlton Caplan of IHE, compounded the uncertainty first by conceding that its tests of the smoke and fumes rising from the molten slag revealed lower concentrations of lead "than would be expected," JA 1867, and then suggesting rather cryptically that *if* the concentrations are greater than IHE discovered, DBA's

recommended controls might prove inadequate. *Id.* The best available evidence from OSHA and industry consultants was thus rather ambiguous, but OSHA could conclude from Caplan's remarks that this operation is less troublesome than LIA would want us to think, and we are inclined to grant OSHA a great deal of discretion in its conclusion here.

Refinery. Refining occurs when the metals are melted in hemispheric pots to remove impurities in the form of dross. Large operations requiring overhead cranes are difficult to control, and portable ventilation that does not prevent access to molten lead during drossing is necessary. Exh. 26 at 5-32. DBA found that the smelters used hoods for the drossing, but not for charging and meltdown. *Id.* And IHE concluded that conventional technology, such as better hoods and ventilation and isolation, could achieve the 100 ug/m^3 level. JA 1867-1868. This rather optimistic assessment from an industry consultant, combined with Bergsoe's suggestions about separating the refinery from the smelter, JA 914, provided a reasonable basis for OSHA to conclude that the PEL might be achieved within five years through aggressive development of these engineering controls and supplemental administrative controls.

Casting and fabrication. Casting is the creation of ingots from bullion; fabrication is the creation of plates or wires. DBA found few current controls in either operation, Exh. 26 at 5-32, but both it and IHE suggested that 100 ug/m^3 was a feasible level if industry hooded and ventilated these areas, *id.*; JA 1868, and in the absence of any evidence that this stage of the smelting process creates unusual problems, OSHA could conclude that the final PEL could be met in five years.

Baghouse and flue dust handling. Baghouses capture lead fumes from furnace operations. Some plants use automatic systems that feed the dust into the blast

furnace. Others use a manual system that is difficult to control, though of course OSHA could expect all plants to convert to the automatic system within five years. Though not committing themselves to predictions of specific low exposure levels, both DBA and IHE commented that automated systems with improved ventilation and isolation could solve the exposure problem. Exh. 26 at 5-33; JA 1867. Moreover, the flash agglomeration of dust recommended by Bergsoe, JA 1936, would make handling of dust much cleaner while increasing the efficiency of the system. 54484/3. This evidence is sufficient to support OSHA's optimism about this process.

Maintenance. OSHA virtually concedes that maintenance workers in the secondary smelters will have to wear respirators. 54483/3. As a matter of the most common sense, we think such a concession consistent with a conclusion that the standard is feasible for the industry, since someone must maintain and repair the equipment which, when working properly, is the means by which the industry meets the PEL. *See* note 126 *supra.*

The evidence on technological feasibility for this industry is complex and uncertain. Nevertheless, it is typical of the evidence we must expect when OSHA forces technology on a slothful industry, and, given the five-year "planning horizon," we think OSHA had substantial evidence for concluding that the PEL was within the secondary smelters' technological capacity.

b. *Economic feasibility.* This difficult question consists essentially of two issues: the likely costs of compliance for the secondary smelters, and the ability of the industry to pass on these costs and thus survive competition with the primary smelters.

Cost estimates. DBA estimated capital costs for the 100 ug/m^3 standard to be $51.1 million and after-tax annualized costs to be $14.8 million. Industry consultant

Charles River Associates (CRA), basing its estimates on unit of capacity rather than unit of production, presented somewhat different figures: $60.6 million and $13.6 million. 54503/1. OSHA found a number of problems of double-counting in these estimates, particularly failure to subtract the costs of meeting the current 200 ug/m³ standard, and made a reasonably precise estimate of the extent of this error. 54503/1-2. OSHA concluded that the likely costs of the 100 ug/m³ standard would be $34.1 million in capital investment and after-tax annualized costs of $9.8 million, figures which translate into a cost equivalent to 1.3 cents per pound of lead produced. 54503/2. OSHA confessed difficulty in adjusting this estimate to the problem of meeting the 50 ug/m³ standard, since the industry has so many means of compliance with that standard available. Nevertheless, OSHA estimated the upper limit of such costs by assuming that the entire industry had to rebuild to install the Bergsoe process. Relying on Bergsoe's own figures in the record, JA 940, OSHA converted the likely price of $2.5 million per smelting plant into a total capital estimate for the industry of $90.6 million.[142] OSHA insists that actual capital costs will be smaller, since many plants will be able to improve some of their operations by retrofitting old equipment, and since the Bergsoe process and possibly other new means of compliance are likely to improve the productivity of the smelters. In any event, the $90.6 million estimate would still mean annualized *after-tax* costs throughout the industry of 1.3 cents per pound of lead. 54503/2. Moreover, Bergsoe himself estimated that the

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[142] OSHA could reason, of course, that the industry would choose the Bergsoe system from among other means of compliance, since it is the most efficient and cost-effective means of overhauling an antiquated smelter. *E.g.*, JA 1929 (Mackey & Bergsoe) (potential $100 million annual saving in battery breaking); JA 2249 (Bergsoe) (Bergsoe eliminates solid waste problems resulting from slag and battery cases).

productivity of his process would allow a smelter turning out 20,000 tons annually to pay back the cost of a whole new plant in two to three years. JA 942.

LIA challenges the upper-bound OSHA estimate of $90.6 million, but we reject the challenge. First, LIA claims that every new Bergsoe smelter will require a new refinery. But they cite no evidence for this claim, and Dr. Mackey, the Bergsoe representative in this country, testified that in Europe Bergsoe has managed to separate smelting and refining in wholly distinct units and buildings. JA 900-901. Further, Bergsoe's $2.5 million estimate for each plant, on which OSHA relied, expressly includes a refinery. JA 940. Second, LIA argues that the Bergsoe process is of little use to small smelters that produce fewer than 20,000 tons a year. OSHA could conclude, however, both that many smaller plants could comply by other means and that the potential loss of smaller firms would not prove the standard economically infeasible for a notably unconcentrated industry. *See* 54503/2. Finally, LIA argues that the actual cost of a new Bergsoe plant will be $10-14 million, and that each smelter will have to purchase two Bergsoe furnaces. These arguments, however, are based on extra-record or unreliable evidence.[143]

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[143] The higher industry estimate derives from an extra-record trade publication article, which is in any event unreliable because it does not explain whether its high estimate for a single installation includes a land purchase or the building of only one furnace. The argument that each plant will require two furnaces derives from a rather ambiguous exchange between Bergsoe and an industry questioner during the hearing. Bergsoe conceded that since the $2.5 million per smelter estimate was for a plant that produces 20,000 tons annually, the estimate would have to be doubled for a plant that produces 40,000 tons. JA 940. The questioner then suggested that 40,000 tons was "standard for a mid-sized smelter in this country," *id.*, and Bergsoe replied, "Yes," the questioner immediately thereafter changing the subject. We

Cost pass-through. The ability of the secondary smelters to survive the economic effects of the lead standard probably depends on their ability to pass their costs on to their customers, which in turn depends on whether the primary smelters, with whom they compete, choose to do the same. The secondary smelting industry is not highly concentrated, chiefly because a new entrant needs relatively little capital investment to join the market, Exh. 26 at 6-6, 6-7 to 6-10, so secondary producers have little control over prices, *id.* at 6-10. Thus the secondary smelters will not be able to pass through their costs unless the primary smelters raise their own prices in order to pass through their own costs. OSHA concluded, of course, that the primary smelters would and could do just that in order to meet the standard themselves, 54500/3-54502/1, and OSHA deduced that the secondary smelters would be able to pass on even the costs of rebuilding the entire industry for the Bergsoe process. 54503/2-3. The agency found that only those less efficient firms whose production costs exceed the industry average would have to absorb any compliance costs, and that the harm these firms suffer would cause no general harm to the industry. 54503/3.

Needless to say, LIA challenges this analysis, noting that DBA itself produced a somewhat gloomy forecast on the ability of some of the major secondary smelters to afford the new standard. Exh. 26 at 6-16 to 6-26. But the simple fact is that OSHA flatly disagrees with DBA on the ability of the industry to pass through costs, and we believe that OSHA had substantial evidence for its

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do not infer from this rapid exchange a concession by Dr. Bergsoe that most plants will require two furnaces, especially because, as OSHA persuasively argues, if 50 secondary smelters convert to two furnaces the industry would produce at least two million tons annually, which amounts to three times as much as the market will bear.

position in the debate.[144] LIA also cites the Short Report's prediction that the standard would eliminate 15 percent of the industry through plant closures. Short, however, identified a great number of smelters as "marginal and inefficient," and indeed predicted that the closures would be extended over the next 35 years. Exh. 22 at 3. Moreover, LIA's own consultant, CRA, did not predict serious economic harm to the industry. Exh. 127 at 77.

Perhaps the most serious industry argument, that of the National Association of Recycling Industries (NARI), is that the phase-in schedule for the secondary smelters places them at a competitive disadvantage with the primary smelters. NARI traces this disadvantage to the secondaries' higher cost of compliance with the interim 100 ug/m^3 PEL—estimated at twice that of the primary —and to the shorter time the secondaries have to meet the final PEL—five years instead of the primary smelters' ten years. OSHA insists that this argument misconceives the economic relationship between the two industries and the likely effect of the lead standard on the secondary industry. While we might well disagree with OSHA in this extremely speculative economic area if we weighed the evidence from our own perspective, we cannot say that OSHA lacked substantial evidence for its own position. Specifically, OSHA has shown that the standard's effect on the secondary smelters' competitive strength will not be nearly so great as the industry parties argue.

First, OSHA argues that NARI exaggerates the competitive relationship between the two industries in as-

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[144] OSHA also criticized DBA for failing to even consider the industry's ability to pass costs back to scrap dealers. 54503/3. OSHA, however, has not presented any strong evidence for the industry's ability to carry out such a pass-back, and we do not rely on this factor in assessing OSHA's feasibility conclusions.

suming that their products are fungible. The agency notes that the primary smelters' production goes almost wholly to pure or soft lead, while half the secondaries production goes to hard or antimonial lead. Exh. 127 at 15; SA 1645 (General Battery). Thus any competitive disadvantage the secondaries suffer may be limited to just one half their production. Moreover, OSHA points out that much of the secondary smelters' production is captive—owned by battery producers or other consumers of lead who want a guaranteed supply of their prime raw material. The agency concludes that this lead, not sold competitively, would only enter the market in the very unlikely event that the owner companies stopped producing their major products.

Second, OSHA argues that even where the secondaries suffer some competitive disadvantage, that disadvantage will more likely be due to the natural competitive balance between the two industries than to OSHA's new standard. The primary smelters set the market price for lead. 54503/2-3. DBA in fact stated that the secondary refined lead market was a "competitive fringe to the primary segment of the market." Exh. 26 at 6-10.[145]

Finally, OSHA argues that, given its finding that the primary industry will likely raise its prices at least one cent per pound as a means of recapturing the one half cent per pound cost of achieving the 100 ug/m^3 PEL, 54500/3-54501/1, the secondary industry can do the same and thereby meet what OSHA estimated as its

[145] OSHA notes that the secondary industry is inevitably restrained in its competition with the primary industry by its dependence on the primary industry for its raw materials. Since only 58 percent of all lead produced can ever be recycled, Exh. 22 at 51, and since the secondary industry already recycles 42 to 43 percent of all lead produced, *id.*, there is a natural restraint on the ability of the secondaries to increase their share of the market.

likely cost for meeting the interim standard. That, of course, leaves the question of the cost of meeting the final PEL. Though installing the Bergsoe process will, by OSHA's estimates, cost twice as much per pound of lead as meeting the 100 ug/m^3 level without Bergsoe, the agency does rightly point out that the two costs will not be cumulative: If the smelters want to proceed directly to install the Bergsoe system, which is indeed a matter of existing technological knowledge, they can do so while bypassing the interim PEL altogether under OSHA's express regulations. Section 1910.1025(e)(4). This leaves the industry with only the difference between the cost of the Bergsoe process and the price to which the primaries move. Of course, this difference, while less of a problem than the industry parties have tried to argue, does still represent a disadvantage. But OSHA also notes that the Bergsoe process will increase the productivity of the secondary industry in a way that the conventional controls in the primary industry will not, and that the secondaries can benefit from the ten percent investment tax credit for new recycling equipment. Energy Tax Act of 1978, 29 U.S.C.A. § 46 *et seq.* (Supp. 1979).

We think it possible that the secondaries will remain at some competitive disadvantage with respect to the primaries. We conclude, however, that OSHA had substantial evidence and respectable logic for concluding that this disadvantage, if it does exist, will not pose a fatal threat to the secondary smelting industry. Moreover, OSHA had independent reasons for thinking the five-year phase-in technologically feasible for the secondaries. We therefore find that OSHA has made its case for this industry.[146]

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[146] NARI's final challenge—that a series of federal environmental statutes prohibits grossly infeasible standards for recyclers and indeed mandates favorable treatment of them—has little merit. Most obviously, since the OSH Act itself bars

3. *Battery manufacture.* The battery making industry is the largest single consumer of lead in the country. By far its major products are starting-lighting-ignition (SLI) batteries. The industry consists of 200 plants owned by 138 firms, the seven largest firms owning almost half the plants and producing 90 percent of the batteries. Lead exposure affects about 12,800 battery manufacture employees. Exh. 26 at 5-42. Battery making begins with oxidization of lead, after which lead oxide powder is mixed into a paste and pressed onto grids cast from lead. The plates are cured, then stacked by hand or by machine, and then "burned" or connected into individual battery cells. 54485/1. All these processes release lead dust into the air. OSHA gave the battery makers two years to achieve 100 ug/m^3 and five years to meet the final PEL.

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infeasible standards, we have no jurisdiction to uphold a standard that puts infeasible restraints on any industry. Moreover, one of the cited statutes, the Energy Supply and Environmental Coordination Act, 15 U.S.C. § 794(a)(2) (1976), simply aims at increasing fuel resources by means consistent with preserving the environment and thus appears irrelevant to this case. Two of the acts, the Solid Waste Disposal Act, 42 U.S.C. § 6952 (1976), and the National Energy Conservation Policy Act, 42 U.S.C. § 6344(a) (1976), aim at encouraging recycling as a useful way of conserving energy in the country, but neither singles out the secondary lead industry for specific preferred treatment. Thus NARI has spun a federal statutory "policy" favoring the industries it represents out of very questionable material. Indeed, another cited statute, the National Environmental Policy Act, 42 U.S.C. § 4321 *et seq.* (1976), requires federal agencies "to use all practicable means, *consistent with other essential considerations of national policy,* to * * * attain the widest range of beneficial uses of the environment *without degradation* [*or*] *risk to health or safety* * * *." *Id.* § 4331(b)(3) (emphasis added). NARI makes other attempts to prove the lead standard violates federal statutory policies, but it nowhere proves that OSHA has contravened a specific congressional command.

a. *Technological feasibility*: Except for a few operations, to be discussed below, OSHA had relatively strong evidence that the final PEL was technologically feasible for battery manufacture, especially because the air-lead levels for more than 40 percent of all exposed battery w('kers are apparently near or below 50 ug/m³. Exh. 26 at 5-45. Since there was plentiful testimony that the industry could generally achieve a level of 100 ug/m³ with currently available technology, SA 1805-1806 (Steelworkers); SA 1001 (Thomas); SA 348 (Caplan), OSHA could certainly find the interim two-year deadline for achieving 100 ug/m³ feasible. And other testimony about technological development in the industry amply supports the feasibility of the five-year deadline for meeting the final PEL.

IHE recommended engineering controls that were generally lacking in the industry. These included (1) handling oxide in bulk by pneumatic conveyors; (2) mixing paste in a vertical array and ventilating the mixing process; (3) mechanizing and enclosing reclaim facilities; (4) hosing down racks and pallets; and (5) central vacuum cleaning for floors. Exh. 29(29A) at ii (IHE). Although these controls are primarily feasible in large plants where production is continuous and workers do not rotate, OSHA found evidence that scrupulous housekeeping and personal hygiene could enable small plants to be equally successful in reducing exposure, *e.g.*, JA 327-347 (Schneider), and indeed some of the lowest exposures recorded in the industry have been at small plants, JA 187 (Mirer), 248-250 (Hull). OSHA also found that employee rotation could be very beneficial in small plants in meeting a time-weighted PEL. 54485/3. Finally, as a general matter OSHA found promise in a new technique of using negative ionization, now being developed by two commercial firms, to collect airborne lead on factory floors for easy removal. JA 225-242 (Gallagher).

OSHA carefully marshalled its evidence on specific operations within the battery industry. 54486/1-54488/1. We summarize the major points:

Oxide manufacture. Exposure levels in this operation are now generally over 200 ug/m³, but OSHA had evidence that ventilation and isolation controls and vacuum devices available for almost 40 years could reduce exposure almost to 50 ug/m³, JA 1555 (United States Public Health Service), and Dr. Franklin Mirer offered evidence that oxide mills could be designed as closed, "zero-emission" systems. JA 1972.

Oxide receiving and handling. Handling oxide delivered from outside the battery plant in drums or tank trucks causes exposure between 100 ug/m³ and 200 ug/m³. Conventional barrel or screw conveying systems are apparently not susceptible to very good lead-dust control, but OSHA found evidence that total enclosure of handling moving oxide by air pressure or augur, JA 1972 (Mirer), or pneumatic conveying, Exh. 29(29A) at 12 (IHE), raise some promise of meeting the PEL. This could, however, be one operation requiring supplemental respirator control.

Paste mixing. Exposure here usually exceeds 100 ug/m³. Exh. 26 at 5-42. IHE found that small plants might achieve 100 ug/m³ by installing hooding and cleaning facilities for the drums used in mixing. Exh. 29(29A) at 13 (IHE). For large plants IHE suggested a new vertical array design. *Id.* at 15. OSHA had some evidence to predict that rigid administrative and hygiene controls could then make up the difference in meeting the final PEL, 54486/3, relying on the general testimony of Schneider, JA 327-347, and others.

Pasting. Exposures here also exceed 100 ug/m³. Exh. 26 at 5-47. For this operation the evidence stressed washdown in plants of all sizes, Exh. 29(29A) at 16, and IHE

suggested meeting 100 ug/m^3 would be possible through ventilation and enclosure. *Id.* OSHA predicted that isolating pasting from other sources of contamination and rigorous housekeeping might achieve the final PEL, 54486/3, relying in part on Thomas' suggestion that, in small plants at least, building the pasteline feed on an open grid floor over flowing water or keeping the floor permanently wet might do the job. SA 1024.

Plate curing and handling. The record indicates that washing the racks used to transport pasted plates can achieve 100 ug/m^3, Exh. 29(29A) at 35 (IHE), and that separating pallets used to transport grids from those used to transport plates, storing equipment and materials in sealed containers, JA 1977 (Mirer), and ensuring rigorous housekeeping could reduce exposure to the final PEL. 54486/3-54487/1.

Grid and parts casting. The record showed that the PEL is immediately accessible in this process through hooding and thermostats on casting machines. JA 1978 (Mirer).

Plate breaking and finishing. Levels of 200 ug/m^3 and probably 50 ug/m^3 are possible in this operation, JA 1042 (Thomas), probably through exhaust ventilation and housekeeping controls. JA 1974-1975 (Mirer).

Plate stacking. Plate stacking *by hand* is likely to be one of the processes in which supplemental respirator controls could prove necessary. OSHA found evidence of some success in reducing exposures through incentive pay practices that encourage speedy handling of plates and rigorous housekeeping. 54487/1. In any event, one small manufacturer has attained levels between 50 and 100 ug/m^3 in this operation, JA 1042 (Thomas), and the evidence suggested that improved ventilation and administrative controls could achieve 100 ug/m^3. Exh. 29(29A) at 27 (IHE).

Problems in handling stacking cannot seriously threaten the feasibility of the standard, however, since, at least for large plants, the evidence indicated that the PEL is very likely to be feasible for machine stacking. IHE suggested designing stacking machines with better enclosures and heavy duty doors, Exh. 29(29A) at 28 (IHE), as the best technical approach.

Burning. This may be a troublesome operation, especially since burning operations vary greatly among plants so the record cannot easily predict appropriate engineering controls. 54487/2. In plants which conduct burning apart from plate stacking or handling, local ventilation may achieve 100 ug/m^3, SA 1061 (Thomas). Where stacking and burning occur together the problem is especially difficult, but OSHA found some promise, at least in larger plants, in the use of a COS stacker, a machine that accepts stacked plates from a stacking machine and groups and burns the plates automatically. Exh. 29(29A) at 28. Firms will likely have to use supplemental respirators in burning.

Assembly operations. Since the record suggests that much of the exposure of assembly employees is due to their proximity to other, dirtier operations, 54487/3, OSHA found that isolation and housekeeping were likely to prove successful in this area.

Reclaiming. Both wet and dry reclaiming systems will likely achieve at least 100 ug/m^3—in large plants through a hopper-loaded wet tumbling system, Exh. 29(29A) at 34 (IHE), and for small plants through an enclosed system in which the plates remain in scrap barrels during washing. *Id.* Caplan carefully detailed a promising arrangement for dry reclaiming. *Id.* But most important, Mirer noted that industry could simply cease this process until better controls can be designed, at a cost only of accumulations of inventory of scrap, costs which remain ultimately recoverable. JA 1978. Mirer sug-

gested such controls could include conventional controls on materials handling and ventilation for reworking junk batteries. *Id.*

Other operations. IHE has indicated that conventional controls can reduce exposures below 100 ug/m^3 in such secondary operations as forming cases, testing, warehousing, and shipping. Exh. 29(29A) at 37.

We conclude that OSHA had substantial evidence to predict that the battery manufacturers could achieve both the interim and final PEL's in most operations within the deadlines the standard establishes.

b. *Economic feasibility.* Revising DBA and CRA estimates for double-counting, OSHA determined likely industry costs of lowering exposures to 100 ug/m^3 and concluded that the costs would not be significantly greater for meeting the final PEL. OSHA then found that the industry could probably pass these costs on to consumers with relative ease, and that the loss of any small firms who could not pass on such costs would not imperil competition in the industry. 54503/3-54506/1.

DBA and CRA offered capital cost estimates for meeting 100 ug/m^3 of $345 and $307.7 million, respectively, attributing those costs entirely to engineering controls. Exh. 65B at 12; Exh. 127 at 2. Estimated annualized after-tax costs were $42.2 and $47.5 million. Though different methods of calculation produced these different estimates, both consultants relied on a single source of data—the IHE study prepared for Battery Council International. Exh. 29(29A). OSHA very carefully indentified and measured evidence of double-counting in the IHE figures. OSHA found that IHE had failed to distinguish costs of compliance with the present standard from costs of equipment already in place, had improperly allocated the costs of new production equipment to control costs, and had included costs for external air and water

pollution control. For example, OSHA determined that IHE's estimate for one three-plant study was probably 30 percent too high because it included the costs of achieving the current standard of 200 ug/m³. 54504/2. As another example, IHE used the costs of installing an entire new ventilation system to meet a ventilation goal, while OSHA found that the goal could be met by merely adding improvements to the existing ventilation system at one fourth the cost. *Id.* In addition to identifying these sources of double-counting, OSHA found that the consultants had erroneously focused on engineering controls alone, whereas administrative and work practice controls, which the final standard places in the same preferred position as engineering controls, would reduce costs considerably. OSHA's revised estimates for the 100 ug/m³ level were for a range of $205.1 million and $230 million for capital costs and $25.0 and $28.1 million for annualized after-tax costs.[147]

Though, as with the smelters, OSHA suggested that no hard cost estimates were possible for meeting 50 ug/m³ since technological developments over five years remained speculative, OSHA found that the conventional controls likely to meet the interim PEL would be the same ones used to meet the final PEL. 54505/1. Thus OSHA doubted that the incremental costs of the final PEL would be significant.[148] Nevertheless, to allow for the possibility of increased costs OSHA reverted to some

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[147] OSHA thought the smaller battery plants in particular would be able to use administrative controls that required no capital expenses. 54504/3.

[148] Though Caplan of IHE appeared to concede that the same conventional engineering controls aimed at the 100 ug/m³ standard might meet the lower standard, he did suggest proper handling of pasted plates might require a fully redesigned battery plant. JA 678-679. Nevertheless, he conceded that he had not considered alternate means of conveying pasted plates. JA 679.

of the consultants' estimates in assessing the ability of the industry to pass compliance costs on to consumers. Thus OSHA assumed the accuracy of CRA's estimate that the battery makers would have to pass through a cost of $0.74 per battery which, allowing for markups in the distribution chain, would mean a retail increase per battery of $1.75. Exh. 127 at 3-35. OSHA concluded that because the demand for batteries mainly derives from demand for automobiles, because there are no close substitutes for SLI batteries, and because foreign competition is insignificant, the general demand will be too inelastic for such a retail increase to harm the industry. Exh. 127 at 3-12 to 3-14 (CRA); 54505/2-3.[149]

OSHA also considered the effect of the compliance costs on competition. 54505/2-3. The battery industry, OSHA found, is essentially dominated by a few large producers, with a fringe of small independent producers competing in specialized or regional markets. Exh. 26 at 6-37. The industry is also tending increasingly toward oligopoly. Exh. 127 at 3-4 (CRA); Exh. 26 at 6-33. Thus, even assuming DBA and CRA were correct when they predicted that as many as 200 small producers would go out of business because of the standard, OSHA nevertheless could find that competition would survive: at least 30 firms with 100 plants would remain, and the market share of the few large producers, already 90 percent, would increase only slightly. Competition from the smaller firms has never had a serious effect on prices. JA 2393 (United Automobile Workers); Exh. 26 at 6-42; Exh. 127 at 3-7 to 3-9 (CRA); 54505/2-3. But OSHA also doubted the consultants' predictions of the demise of many small firms. The trend toward oligopoly may be an independent cause of such demise, *see* Exh. 127 at 3-6

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[149] OSHA found that small producers in competition with the major firms could pass through costs of $1.04 per battery by entering the chain of distribution at an advanced stage. Exh. 127 at 37 (CRA).

(CRA), and, more important, the consultants' pessimism may be in great part due to what OSHA found to be their great overestimate of the costs of compliance. In particular, our review of OSHA's technological feasibility findings shows that smaller plants may be able to install many control devices more easily than large plants can.

OSHA has thus met its burden of proving the standard is feasible for battery manufacture.

4. *Brass and bronze (nonferrous) foundries.* More than 1,600 foundries produce brass and bronze, which are copper-based alloys consisting of as much as 20 percent lead by weight. Exh. 26 at 5-73; JA 471 (Mosher). Approximately 26,200 workers in nonferrous foundries face exposure to lead. Exposure occurs primarily during smelting and pouring, although there are occasionally very high exposures in cutting and finishing and in storage areas. Exh. 26 at 5-73 to 5-75; 54488/1-2. The nonferrous foundries have one year from the effective date of the standard to reach 100 ug/m^3 and five years to achieve 50 ug/m^3. The prospects for technological feasibility in this industry appear at first to be very good, since OSHA has given the industry five years to meet the PEL and since the record contains at least DBA's conclusory statement that the proposed standard is feasible for this industry. JA 155 (Jurgiel). Nevertheless, and with very great reluctance, we conclude that OSHA has not met its burden for nonferrous foundries.

The record and the Preamble discussion for these foundries somewhat resemble those for the smelters. OSHA has for all these industries analyzed specific operations, found some evidence going to the feasibility of 100 ug/m^3, and relied on general argument about future technology, as well as a fairly long phase-in period. 54488/2-54489/1. The difference lies, perhaps, not in the available evidence, but in the relative sufficiency of OSHA's Preamble analyses and references to the record.

For both the primary and secondary smelting industries, though it has had to contravene DBA's conclusions with respect even to the proposed standard, OSHA has managed to cite some record evidence promising technological developments that might meet the PEL in the long range, and has attempted with some specificity, in some of the major operations in those industries, to explain how it inferred the feasibility of the final standard from a record that chiefly addressed the proposed standard. Here, OSHA performs neither of these two tasks. It relies on the testimony of Gary Mosher of the American Foundrymen's Society to conclude that new exhaust systems can capture fumes at the ladle and furnace, JA 485, but concedes that Mosher offered no opinion whether such exhaust systems could meet even the 100 ug/m^3 standard. 54488/2. It lists conventional devices—such as induction furnaces with exhaust vents, covered ladles, and Hawley Trav-L-Vents—which, it asserts, can be refined enough over time to meet the PEL. *Id.* But it cites no record evidence at all to support this view.[150] It analyzes in modest detail such specific operations as molding, melting, and pouring, and cites the DBA report for suggestions on technology that will be necessary to reduce lead exposure, but cites no evidence whatever on the ability of such technology to meet any specific PEL in these operations, and concedes that respirators will be necessary in such other operations as grinding and finishing. 54488/2-3. It concludes by stating, without citation, that lead levels are "not too high in foundries," and that therefore the five-year phase-in should allow enough opportunity to refine all this technology to make the PEL

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[150] The Preamble discussion of the nonferrous foundries does not even cite Dr. First's general testimony, though reference does appear rather indirectly in the OSHA brief, at 228.

feasible for this industry. 54488/3-54489/1.[151] Thus OSHA has hardly asserted, much less offered substantial evidence for, the feasibility of the PEL for these foundries.

Given its reasonable effort at specificity in presenting and analyzing record evidence in the primary and secondary smelters, we were willing to show considerable deference to OSHA's conclusions for those industries. On the bare, unsupported explanation offered here, we cannot do the same for the nonferrous foundries. We therefore remand the feasibility question to the agency for reconsideration during the extension of the stay of the relevant portions of the standard, as described at the end of this opinion. We note that the industry has not in this appeal challenged the economic feasibility of the standard for the nonferrous foundries, but since the technological question remains unresolved, the economic one will be open on remand.

5. *Pigment manufacture.* Approximately 25 plants in the United States make pigments containing lead. Such organic pigments are an important element in surface coatings, linoleum, rubber, plastics, ceramic glazes, and other products. The process of pigment manufacture normally proceeds from pulverizing and grinding the lead to a variety of chemical and physical operations, including precipitation, filtering, washing, and fusing. About 2,000 pigment workers face danger from lead exposure, and virtually all plants reveal air-lead levels well above 100 ug/m^3. Exh. 26 at 5-93. OSHA required the pig-

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[151] The record does contain one piece of potentially helpful evidence: one foundry has apparently achieved air-lead levels consistently in the 70 ug/m^3 range. Exh. 26 at 5-78. However, even though OSHA cites this evidence in its brief, at 226, it never mentions it in the Preamble, and so we cannot rely on it on appeal. Indeed, OSHA may well have considered this evidence too weak for citation.

ment industry to achieve 100 ug/m^3 without resort to respirators within three years and the final PEL within five years. We find, however, that OSHA has not presented substantial evidence for the technological feasibility of the standard for this industry.

Though the DBA report relies in part on the Short Report in its analysis of the industry, OSHA's Preamble discussion of technological feasibility in pigment manufacture cites only the DBA report, and hence we focus on that. DBA states that it is "very questionable that the lead pigment manufacturing industry can immediately meet the proposed standard through increased engineering controls." Exh. 26 at 5-98. As we have seen in other industries, such skepticism from DBA does not prevent OSHA from relying on other evidence and a more sanguine theory of technological development to reach a different conclusion. And indeed this DBA statement speaks only of the feasibility of meeting the *proposed* standard *immediately* and *through engineering controls alone*, whereas the *final* standard phases in even the 100 ug/m^3 standard slowly and allows work practice controls the same preferred position as engineering controls. Nevertheless, OSHA does not, as it does elsewhere, offer sufficient grounds to reject DBA's skepticism.

The DBA report makes two other statements which might appear to support OSHA's finding. First:

> It appears that the best available engineering controls may reduce the levels in the work place to or below 200 ug/m^3, but the use of other techniques (i.e. personal protective equipment, respirator programs and work rotation) will be necessary to meet the proposed standard in some of the work operations.

Id. The last phrase in parentheses does suggest that work practice controls, in combination with engineering controls, might help meet the proposed PEL. But DBA never says that work rotation alone, not in combination

with respirators, could do so, and OSHA's published discussion of technological feasibility for this industry does not mention this possibility. Indeed, that discussion, 54489/1-2, never examines individual operations within the pigment manufacturing process. Finally, of course, DBA's statement does not address the final PEL.

The second DBA statement is:

> From observations of the production process, it may be necessary that the process of manufacturing lead pigments would have to be re-designed to include total enclosure of certain steps and/or automation. * * *

Exh. 26 at 5-98. OSHA uses this statement as the basis for the following analysis in the Preamble—an analysis that represents virtually all of its discussion of technological feasibility for this industry [152]:

> Because of the age of the facilities, retrofitting may not achieve levels below 100 ug/m^3. However, redesign of the process, including "total enclosure of certain steps and/or automation" is expected to be able to reduce levels to a 100 ug/m^3 level. (Ex. 26, p. 5-98.) The same conclusion applies to the 50 ug/m^3 PEL. As Dr. First explained, "every operation that can be mechanized and automated is capable of being enclosed by tight physical barriers and placed under slight negative pressure to prevent outleakage of dust or fume-laden air to the workroom"

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[152] OSHA also found some support for the standard in a NIOSH recommendation that the agency establish a new standard to reduce exposures of hexavalent chromium to 1 ug/m^3. 54489/2. OSHA may be correct in arguing that if it sets a standard for chromium according to this recommendation, it will be reducing the lead problem for pigment manufacturers that produce lead chromate pigments, *id.*, but the feasibility problem would remain for all other pigment makers, and, in any event, we do not think the possibility of a future related standard amounts to evidence for the standard in question.

(Ex. 270, pp. 29-30). While such technology may require time and money to install, it is available and adaptable to the pigment industry.

54489/1-2. Read most generously, DBA's statement suggests that employers can meet the 100 ug/m^3 PEL if they rebuild their factories. And indeed nothing in the OSH Act or its judicial history bars the agency from requiring such rebuilding if it is economically feasible.[153] But we think OSHA's inferences from this statement lack both logic and supporting evidence. First, DBA's statement is superficial and casual. Like OSHA's own analysis, it neither examines operations individually nor describes with any specificity the technology the industry would incorporate in its new factories. At best, the statement is a very hedged prediction about the possibility of meeting the proposed or interim PEL. Thus OSHA's finding of feasibility for the 50 ug/m^3 level makes little sense, except to the extent it finds independent support in the Dr. First testimony. We relied on that testimony in part in upholding OSHA's finding that the standard was feasible for the primary smelters. There, however, Dr. First's broad generalizations supplemented, and justfied a more optimistic interpretation of, other evidence specifically addressed to operations within the primary smelters. Here, OSHA relies on Dr. First's generalizations as its *central* evidence on feasibility of the standard for an industry Dr. First never mentioned. We thus find the final statement in the quoted passage from OSHA's analysis essentially unsupported.

The only other ground OSHA offers for the general feasibility of the standard for the industry is the possibility that employers can replace organic for inorganic pigments. 54889/2. OSHA concedes, however, that this substitution may not work for some pigment products,

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[153] This is especially true where, as in this industry, a great number of the plants are over 50 years old. Exh. 26 at 5-95.

and it never attempts to assess how serious the problems of substitution are or how often they will arise. Indeed, OSHA cites not a single statement in the record on this issue.

Since we hold that OSHA has not presented enough evidence to prove the standard technologically feasible for the pigment industry, we need not decide the question of economic feasibility. But we pause to consider the difficulty of separating those questions. OSHA's analysis of economic feasibility for this industry is as optimistic as, and superfically more detailed than, its analysis of technological feasibility. 54506/2-54507-1. And we will assume, without deciding, that OSHA had sufficient reason to believe the industry healthy enough to survive even massive compliance costs. But we do not understand how it could arrive at even general estimates of compliance costs when it is so unclear as to how employers can comply. It first points to capital and dollar estimates in the DBA report and treats them as the "upward bound" of the cost of rebuilding all factories—a task which, as we have seen, may not achieve the final PEL. But then OSHA rejects that estimate for one derived from the Short Report, without explaining whether this latter estimate assumes a less drastic means of compliance. 54506/3. Moreover, these estimates are only for a level of 100 ug/m^3. Finally, OSHA appears to rely for its finding of economic feasibility in part on its notion of substituting organic pigments, but it concedes that it "has no estimate of the likelihood of successful substitution * * *." *Id.* OSHA proceeds to suggest that some firms will meet the PEL through retrofitting and some through redesign, but once again fails to attempt any specific predictions.

OSHA's conclusion that ways will be found to meet the interim PEL in three years and the final PEL in five years may have support in available evidence. But that

evidence does not appear anywhere in OSHA's explanation of the standard. Even from the perspective of our generous view of technology-forcing, and of the very flexible meaning of feasibility under the OSH Act, we think OSHA has failed to offer convincing evidence or sustained logical analysis to justify the standard for pigment manufacture.[154]

With respect to the pigment industry, we therefore remand the feasibility question to OSHA for reconsideration.

6. *Shipbuilding.* The standard affects workers who construct and repair ships through such jobs as lead burning, painting, welding, and sandblasting. About 22,000 workers are so exposed, though since the individual jobs are often rotating and transient they may be exposed for only one or two days each week. OSHA found evidence of very wide variations in air-lead levels of such workers. Welding and lead burning seem to expose workers to levels well above 100 ug/m^3. Painting often produces lower exposures, but exposure may be a serious problem for employees working in spray paint booths, where respirators have been a rule of thumb. 54489/2-3. OSHA gave this industry one year to meet the final PEL. The hearing record and Preamble discussion of the shipbuilding industry at first appear to present a very strong and optimistic picture of the technological feasibility of the standard. And, in the context

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[154] We stress our general point that OSHA need not prove the standard practicable for all operations at all times. Indeed, in the two smelting industries and the battery industry, for example, we upheld OSHA's finding of feasibility where we found substantial evidence for some but not all of the operations in the industry. But here, OSHA has not even attempted separate examination of each process. We therefore find no basis for a presumption of feasibility in *any* process in pigment manufacture, especially since the general evidence on the industry is exceptionally scanty.

of our general view of feasibility, we would probably be prepared to uphold a standard with a PEL of 100 ug/m³. OSHA's case for the technological feasibility of the final PEL, however, does not survive careful scrutiny.

The hearing did produce several confident, if very general, statements that the proposed standard was technologically feasible for the industry. JA 155-156 (Phillips), 2022 (Shipbuilders Council). LIA argues that those statements, one from a consultant and one from an industry spokesman, fail to support the standard, not only because they address a higher air-lead level, but also because the proposed standard appeared to allow supplemental respirators far more generously than the final standard. This argument in itself, however, does not invalidate OSHA's finding of feasibility. The witnesses testifying that the proposed PEL was feasible might have relied on the availability of supplemental respirators because the evidence showed, and OSHA has conceded, that some peculiar operations in shipbuilding are simply not conducive to engineering controls. Thus respirators are probably inevitable for spray painting in booths, Exh. 26 at 5-117, and for lead burning in extremely confined spaces, JA 156, where there is insufficient room for portable ventilation ducts, Exh. 26 at 5-119. As we noted at length earlier, the standard can be feasible generally for an industry even where it is, either on the facts or by OSHA's concession, infeasible for certain operations within that industry. In such industries employers face a presumption of technological feasibility in most operations, but a diminished presumption in the problem operations. Thus the evidence and concessions about such troublesome operations as spray painting and confined lead burning do not necessarily invalidate the standard for shipbuilding.

But where such questions arise about specific operations, OSHA must still examine individual operations to

show that the standard can be met in most of them.[155] Here, with respect to the 100 ug/m³ standard, OSHA merely offers DBA's statement that "engineering controls are feasible for *many* lead burning and lead foundry operations in the shipbuilding industry." JA 155 (emphasis added). Its evidence and analysis for this industry are insufficiently detailed and precise to justify the general presumption of feasibility. Under its analysis the conceded or apparent exceptions to the full presumption might overwhelm that presumption. We simply do not know how much of the industry falls into the exceptions.

More important, even if the general allegations of the feasibility of the 100 ug/m³ level are sufficient, OSHA's only adversion to, much less evidence in support of, the final PEL is the following statement: "Periodic use of respirators may also be necessary for compliance with the 50 ug/m³ standard." 54889/3. In other industries, such as primary smelting, where OSHA has offered relatively specific evidence on the technological feasibility of the proposed PEL *and* where it has given the industry ample time to devise means to meet the final PEL, we have given a generous meaning to the philosophy of technology-forcing. Here, however, OSHA has given the shipbuilders only one year from the effective date of the standard to meet the final PEL without respirators. We thus cannot grant OSHA much margin for error in its speculations about technological development, because

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[155] We do not suggest that OSHA must always present a detailed analysis for individual operations in supporting the feasibility of the standard. In industries where lead exposures are generally very low, or where strong evidence shows the standard to be technologically practicable for the most troublesome parts of the industry, OSHA can find the standard generally feasible and allow the variance process to account for unanticipated difficulties in isolated operations. But such an operation-by-operation analysis seems crucial in an industry where the evidence clearly suggests impracticality in important stages of the industrial process.

OSHA has given the shipbuilders virtually no time for such development.[156]

In shipbuilding OSHA obviously faced a peculiar industry, where employees move frequently among very different workplaces and where lead exposure can be serious but very intermittent. Such an industry requires a feasibility analysis that carefully considers all its peculiar characteristics. OSHA has not presented such an analysis. Therefore, we remand the feasibility question to the agency for reconsideration. Since we find that OSHA has not presented substantial evidence of the technological feasibility of the standard for shipbuilders, we need not address the question of economic feasibility. That question, of course, may be reopened during OSHA's reconsideration.

7. *Auto manufacture.* Lead enters automobile manufacturing through two processes—soldering and spray painting. Exposure in both processes is high, despite some record evidence that the manufacturers have already reached the "state-of-the-art" in engineering and work practice controls. 54490/2. OSHA nevertheless gave the auto industry only one year to meet the standard without respirators. We find OSHA's Preamble discussion of the problems of technological feasibility in this industry reasonable and candid in assessing the need for respirators in many operations. In its candor, however, OSHA virtually concedes that the standard is infeasible. We therefore find baffling its express conclusion that the

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[156] OSHA does offer some evidence that replacement of lead-based paint with organic-based paint will reduce exposures, Exh. 22 at 321, and that careful welding techniques might make "exposure above the PEL * * * less likely." 54490/1; Exh. 26 at 5-119. This evidence, however, is too vague and weak to overcome OSHA's failure to analyze this industry with sufficient care. In particular, OSHA does not prove that organic-based paint can meet the needs of the shipbuilders.

standard is feasible. Apparently OSHA believes it can concede the impracticality of sole reliance on engineering and work practice controls in many operations and yet nevertheless justify a general presumption of feasibility for the industry. As we have seen, that view may be correct—up to a point. Here OSHA has passed that point, creating a presumption with so many conceded exceptions as to be no presumption at all. Moreover, because OSHA has only given the industry one year to meet the final PEL without respirators, it cannot rely on its general principle of technology forcing.

Solder, which is 95 percent lead, is used in both structural and sheet-metal work in numerous places along the automobile assembly line. The soldering and solder grinding is usually done in ventilated booths which fit directly over the assembly line. Each worker however, must wear an air hood—a form of respirator, JA 2027 —while he does the soldering, JA 2027 (UAW), and while OSHA states that some companies have reported "some success" in reducing exposure through refined high-velocity/low-volume ventilators, 54490/2, the agency does not seriously assert that 50 ug/m^3 can be achieved without the hoods. OSHA does cite specific evidence in the record showing that further refinements in booth ventilation are possible, *id.*, but the agency nevertheless states that "until changes in design or material take place, the combination of engineering controls and airline hoods now in use appears necessary to insure that grinding complies with either a 100 or 50 ug/m^3 standard." *Id.* OSHA does suggest that the industry might ultimately eliminate exposure by engineering the solder out of the automotive design, or substituting plastics or expoxies for lead-based solder. *Id.* But it nowhere suggests the practicality of achieving these goals within any specific period of time, so this suggestion hardly justifies OSHA in requiring the industry to meet the standard without respirators within one year.

We find virtually the same problem with spray painting. OSHA cites evidence of a few promising means of reducing exposures—substituting organic-based paint for lead-based paint, using downdraft or backdraft ventilation in spray booths, or automating the spray booths. 54490/2-3. But OSHA itself downplays much of this evidence, noting, for example, that organic-based paint may be infeasible because it cannot adequately resist corrosion, or that automatic spray booths are not always feasible. *Id.* Thus OSHA cites without disagreement the conclusion in the Short Report that "at least in some cases exposures may exceed 100 ug/m^3 even in an adequately designed, operated, and maintained booth. (Ex. 22, pp. 228-29.)" 54490/3.

OSHA thus appears to concede, with admirable realism, that respirators will play a central role in this industry. But it restricts this concession to a "limited number of specific operations" in the industry. *Id.* Once again, we do not require OSHA to prove the standard technologically practical for all operations in an industry. But here OSHA has not proved—or even expressly asserted—the feasibility of the standard for *any* operations. A common sense reading of OSHA's analysis suggests that OSHA does not expect the auto makers to meet the PEL without respirators in most of the assembly line areas affected by lead exposure.[157] If that is true, we simply cannot fathom the meaning of OSHA's decision to give the industry one year to meet all requirements of the standard. Nor does OSHA ever offer a meaning. OSHA no doubt expects to act reasonably and flexibly in entertaining petitions for variances in this industry, and indeed a permanent variance application from the auto-

[157] OSHA's unsupported statement that "this industry has historically displayed great ability to make technological change when necessary," 54490/2, hardly amounts to evidence on this issue.

makers is now under review in the agency. 44 FED. REG. 6791 (1979). But under our general analysis of feasibility, variance procedures should come into play only after the agency has justified a presumption of feasibility for the standard, at least for most of the operations within the industry. Here, given OSHA's concessions and lack of proof about the feasibility of the final PEL, we are unclear as to what the automakers will have to prove in these proceedings. Perhaps OSHA will expect them to show that they have reasonably attempted some of the process refinements OSHA cites in the Preamble. But that still leaves us wondering what OSHA means by the one-year compliance standard. If the agency wants to force technology here, it must at the very least give the industry more time to do so. If the agency does not even pretend that the PEL could ever be met without respirators, it could certainly make a separate provision in the standard for this industry, perhaps specifying the engineering controls OSHA nevertheless wants the industry to attempt.

OSHA's analysis of technological problems in this industry is thus rational and clear-headed. And we infer that its enforcement intentions for this industry are fair and generous. Our concern is that OSHA includes the automakers in the ambit of the standard only at the risk of undermining the coherence of the standard. We remand the feasibility question for this industry to the agency for reconsideration.

8. *General findings on "other industries."* Of the seven industries we have thus far discussed, DBA placed the five major ones—primary smelting, secondary smelting, batteries, nonferrous foundries, and pigments—in its "first priority" group and performed extensive research and analysis on them. DBA placed the two other industries—auto manufacture and shipbuilding—in its "second priority" group and devoted a moderate amount of

research and analysis to them. The main DBA report, issued February 15, 1977, Exh. 26, reported on these seven industries and no others. OSHA has generally referred to those industries which DBA did not discuss in its chief report as the "other industries." Before we proceed further we must address the scope and nature of this rather ill-defined group of as many as 40 industries, all of which have but one year to meet the final PEL.

One industry party, the American Iron & Steel Institute (AISI), has filed briefs in this appeal specifically addressing the feasibility of the standard for these "other industries." AISI offers specific evidence and argument to rebut the feasibility of the standard for five of these "other industries." But it also argues categorically that OSHA's insufficient evidentiary basis—and its near-total reliance on the much-maligned Short Report—invalidates the agency's findings on feasibility for *all* the "other industries." [158] Before we analyze the feasibility of the standard for these industries, we must consider AISI's attack on the Short Report, and then group these "other industries" according to the extent to which the feasibility finding for each depends on the Short Report and according to the sufficiency of the analysis of each in OSHA's Preamble. Only then can we determine for which of these other industries OSHA's factual findings may be categorically invalid.

AISI challenges the Short Report on three principal grounds. First, as a matter of procedure AISI claims that OSHA illegally failed to give the industries a chance to cross-examine the authors of the Short Report. We have already considered and rejected this claim. *See*

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[158] OSHA has not questioned AISI's standing to challenge the standard as it applies to all these "other industries, and we assume the issue of the feasibility of the standard for all these industries is properly before us.

Part III-E *supra*. Second, AISI argues that the Short Report consists chiefly of cursory conclusions based on "blind" data which Short never revealed to the parties or even to OSHA. Whether the Short Report was superficial or fragmentary is a question we need not address in general, since it arises when we consider the sufficiency of the evidence for specific industries. As for the charge that the consultants hid the data from public view, there is ample evidence that OSHA consultants have only been able to obtain data from some companies by promising to keep it confidential. *E.g.*, SA 37 (Burton); Exh. 26 at 5-99 to 5-100. Third, AISI argues that OSHA cannot rely on the Short Report because the agency itself has expressly criticized the report as superficial and even incompetent. This last argument merits some attention.

OSHA expressly criticizes the Short Report in the Preamble itself, 54473/3-54474/1, in explaining why it hired DBA to supplement Short's research. That criticism, significantly, goes only to Short's conclusions about the costs of compliance. Moreover, the mere fact that OSHA criticizes one of its consultants' reports cannot bar the agency from ever relying on that consultant's findings, and indeed OSHA has frequently both relied on and criticized findings in the DBA report. The basis for OSHA's criticism of the cost-of-compliance findings in the Short Report, however, is revealing.

On November 5, 1976 the Assistant Secretary of Labor for Policy, Evaluation, and Research wrote a memorandum to OSHA about the Short Report, stating that

> the data on which estimates of costs and benefits are based are totally inadequate—eight observations representing 13 plants in a few industries are essentially used to estimate costs in 70,000 establishments in over 40 industries. The cost data are particularly bad. They do not and cannot capture the differences

> in costs among firms that produce the different products that are affected by the lead standard. The methodology used in the absence of actual cost data is inadequate to overcome the data problems. The costs and benefits of meeting the proposed standard, as opposed to the current standard, are not measured. Finally, the analysis of the economic consequences of the cost of compliance contains a number of serious errors.

Evaluation of the Inflation Impact Statement on Proposed Lead Standard, JA 2165-2166. The Acting Chief of OSHA's Office of Environmental, Inflationary and Economic Impact essentially concurred in this view, JA 2186, which was rather obviously the basis of OSHA's statement in the Preamble. Though OSHA argues in its brief that any flaws in the Short Report were indeed *over*estimates of compliance costs and thus cannot harm OSHA's finding of feasibility, the memorandum we have quoted at length never mentions overestimates. Rather, it casts doubt on the general accuracy of Short's findings. We cannot accept as substantial evidence findings in a report which OSHA has itself found so unreliable. Thus we agree with AISI at least that where OSHA's findings of *economic* feasibility rest *solely* on the Short Report we cannot find substantial evidence.[159] We must, of course, identify those industries in the category of "other industries" to which this problem applies.

We first note, however, another problem in OSHA's findings which, in our view, categorically invalidates some of the agency's conclusions about feasibility. This problem lies, not with OSHA's evidence itself, but with OSHA's duty to present and explain its evidence and

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[159] Since OSHA has not expressly criticized the Short Report's conclusions on technological feasibility, AISI's argument cannot apply to OSHA's conclusions on technological feasibility relying solely on that report.

the analysis which led it to find the standard feasible for an industry.

In its Preamble discussion of technological feasibility OSHA devotes separate sections to ten of the "other industries": electronics, solder manufacture, gray iron foundries, ink manufacture, paint and coating manufacture, wallpaper manufacture, wire patenting, can manufacture, printing, and pottery. 54490/3-54493-2. Thus OSHA has published specific analyses of technological feasibility for a total of 17 industries. All remaining industries are relegated to what is most emphatically the "other" industries category, receiving, on the question of technological feasibility, undifferentiated treatment in the following terse discussion.

> Most of the other industries in which employees are exposed to lead were assessed for technological feasibility in the Short report[.] (Ex. 22.) Because these industries generally have very low lead exposure, any compliance activities will require very simple engineering controls. Short's conclusions regarding these industries' ability to comply with the 100 ug/m^3 level are equally applicable to the 50 ug/m^3 PEL.

54493/3. We find AISI's challenge to this analysis of technological feasibility persuasive. First, while Short did find exposures in some of these industries to be low, *e.g.*, Exh. 22 at 203-204 (leather industry), it found exposures in others to be quite high, *e.g.*, Exh. 22 at 267 (steel alloy during teeming process). But more important, we can find even these facts only by drawing conclusions from our own search of the record. OSHA has not pointed to *specific* evidence in the record for *its* conclusions about any of these industries, or even acknowledged the possibility that these industries might differ in their capacities to comply. Finally, in leaping to its conclusion about the final PEL, OSHA implies that

Short found no problem with the technological feasibility of the proposed PEL. Portions of the Short Report at least cast some doubt on this view. *E.g.*, Exh. 22 at 305.

OSHA may well have, or be readily able to obtain, evidence that exposures in these industries are so low that simple engineering and work practice controls can achieve the final PEL. But the undisputed principle that feasibility is to be tested industry-by-industry demands that OSHA examine the technological feasibility of each industry individually. Moreover, in giving us no specific synthesis of the record evidence to check for substantial evidence, and no explanation of its reasoning and assumptions to check for logic and fairness, OSHA has undermined our task of judicial review.[160]

In its March 1977 Addenda, Exh. 65B, to its chief report DBA examined nine of the "other industries," including can manufacture, printing, wire patenting, gray iron foundries, wallpaper manufacture, paint and coating manufacture, ink manufacture, solder manufacture, and pottery.[161] Since the economic feasibility of the standard for these nine industries received at least some attention from DBA, for these industries OSHA escapes the charge that it relied solely on the discredited Short Report. The

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[160] Since we cannot uphold OSHA's findings on technological feasibility for these industries, we need not address the issue of economic feasibility for them. We note, however, that OSHA's Preamble analysis of this issue, 54507/3-54508/1, while certainly more detailed than its one-paragraph treatment of technological feasibility, 54493/3, suffers from the same flaw of failing to treat these industries individually. Even some of the industries which received separate analysis for technological feasibility were lumped into this undifferentiated analysis of economic feasibility, a problem we will address when we discuss those industries below.

[161] The Addenda addressed a tenth industry, construction, which we need not include here because OSHA exempted it from the standard. *See* text at note 168 *infra*.

list of "other industries" examined in the DBA Addenda is essentially identical to the list of "other industries" which received individual treatment in the OSHA Preamble. One industry, electronics, was given individual attention in the Preamble and yet did not appear in the DBA Addenda, but OSHA's evidence for that industry never relied on the Short Report. Adding electronics to the nine industries reported in the DBA Addenda, we have a list of ten "other industries" which escape AISI's categorical attack. We proceed to consider OSHA's feasibility findings for these industries one by one. We remand the feasibility question for all the remaining "other" industries to OSHA for reconsideration and separate treatment.[162]

9. *Analyses of specific "other industries".* We now review the feasibility evidence for the "other" industries the OSHA findings on which are not categorically in-

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[162] Following the industry list in the Short Report, Exh. 22 at 21-25, we note that these remanded industries would include: brick, agricultural pesticides, leather, pipe galvanizing, gasoline additives, linoleum-rubber-plastics, paint sprayers (other than those in the automobile industry), ammunition, smelting and refining of zinc, silver, gold, platinum, copper, and aluminum, machining, lead burning (other than in shipbuilding), glass, textiles, paper, book binding, steel alloy, terne metal, glass polishing and spinning, cutlery, diamonds, plumbing, jewelry, pearls, casting, cable coating, electroplating, explosives, lamps, sheet metal, tin rolling, and lead products not otherwise classified. To this list we add two industries, telecommunications and collectors and processors (not including those working for secondary smelters), which have been addressed in briefs but never even mentioned in the Preamble.

OSHA's brief does argue that there is substantial evidence with respect to some of the industries on this list, such as glass manufacture and telecommunications, but such arguments can be no more than post-hoc rationalizations where the published explanation for the standard does not give these industries specific analysis.

validated by the problems we have discussed above. We stress that each of these industries has just one year to meet the final standard.

Electronics. Two representatives from this industry reported extremely low levels of lead exposure. Zenith reported levels of between 2.1 and 8.0 ug/m^3 in its soldering operations, where most lead exposure occurs, JA 1376, and Motorola reported figures of 10 to 12 ug/m^3 for the same operations, JA 1333-1334. Thus the PEL is obviously technologically feasible. Motorola did report exposures as high as 73 ug/m^3 in solder cutting and trimming, but these levels are still so low that OSHA could conclude that ordinary improvements in ventilation would lower these to the PEL. 54490/3.

Electronics is one of the "other" industries which did not receive a separate analysis for economic feasibility. However, the ease with which this industry can adapt to the standard technologically essentially moots the economic question. We thus uphold OSHA's conclusions for the electronics industry.

Gray iron foundries. About 80 percent of all durable goods contain some gray iron casting. Exh. 65B at 27. Lead enters the gray iron industry chiefly through the iron scrap which the foundries process. *Id.* at 25-26. The foundries generally pick over their scrap and break lead or other resalable materials out of the scrap iron before melting, and this process greatly reduces the lead entering the furnace. *Id.* at 26. In any event, the salient fact is that, according to DBA, there is virtually no evidence of any measurable lead exposure anywhere in the industry. *Id.* at 27. Though DBA does candidly concede that this absence of evidence may be due to industry's failure to even recognize the problem, industry parties have not argued that there is troublesome lead exposure in the foundries, and OSHA was certainly reasonable in relying on DBA's findings as some support for its conclusion on

technological feasibility. Moreover, OSHA did carefully document those situations and those types of foundries in which lead exposure might theoretically occur, 54491/2-3, and reported DBA's recommendations on the proper conventional technology foundries could install where the problem might develop. We thus find substantial evidence that the standard is technologically feasible for this industry.

As for economic feasibility, DBA freely conceded that, given its difficulty in finding any evidence of lead exposure in the gray iron foundries, it could make no estimates of compliance costs. Again, since there is no challenge to the feasibility of the standard for this industry except in AISI's categorical attack, and since we have upheld OSHA's finding that there is no serious exposure problem here, we see no reason not to affirm OSHA's conclusion that the foundries can meet the final standard within one year.

Ink manufacture. Lead pigments are used in about 100 ink plants, threatening lead exposure to over 1,000 workers. Almost all exposure occurs when workers disperse dry pigments into oils or solvents; there is little exposure once the lead has become part of the ink. 54991/3. DBA surveyed exposures in the industry and concluded that as many as two thirds of exposed workers may face airborne lead above the PEL. Exh. 65B at 38. DBA's recommendations were a bit sketchy but did suggest that ventilation and better housekeeping could probably solve the exposure problem. *Id.* More important, DBA indicated that some plants had stopped using dry pigments and that others have begun formulating base inks at central locations and shipping the base inks to satellite formulation plants. *Id.* Especially since exposure seems confined to this one operation, for which substitute means are available, we find substantial evidence for OSHA's conclusion that the PEL is technologically feasible for this industry.

As for economic feasibility, DBA generated estimated compliance costs from the "average plant" costs supplied by the National Association of Printing Ink Manufacturers, Inc., Exh. 65B at 39; 54507/2. The estimates of $4.6 million for capital costs and $1.25 million for annual costs result in annual per-employee costs of about $1,000, which no party claims to be a hardship. These estimates, of course, are for the 100 ug/m³ level. We would prefer to see some allowance for incremental costs for meeting the final PEL, and think OSHA might well have estimated costs for eliminating dry lead pigments in ink. But in the absence of contrary evidence or argument, we think OSHA was justified in concluding that the controls and substitutions needed to meet the final PEL would not unduly harm the industry.

Paints and coatings manufacture. Lead chromates are important pigments in several colors of paints or coatings for exterior or maintenance uses. Manufacture of these paints and coatings expose as many as 9,000 employees to airborne lead. 54992/1.[163] Most serious exposure occurs very briefly and intermittently. During the lead paint mixing operation in a small plant, for example, exposure will be a problem only for 15 to 30 minutes once or twice a month. Exh. 65B at 35. Though DBA found exposures ranging rather wildly from 0 to 1,000 ug/m³,

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[163] Our analysis is limited to the manufacture of paints and coatings. We have placed spray painting among those industries for which the feasibility question must be remanded because OSHA failed to perform separate analyses for them. *See* note 162 *supra*. AISI attacks OSHA's findings on paints and coatings, not altogether coherently, by suggesting that lead paint creates a form of exposure generically different from that created by most lead operations, so that the standard should not apply to it as it does to other operations. AISI brief at 61a-65a. We understand AISI's challenge to be chiefly directed at the standard's application to spray painting, not to paint manufacture, and so find it irrelevant to this analysis.

it concluded that the disparity was due to extreme differences in the design and condition of ventilation systems. *Id.* It suggested that, since exposure occurred so briefly and intermittently, administrative controls would be successful at reducing exposure. Moreover, DBA's suggested means of compliance with the 100 ug/m^3 PEL did not include respirators. We think OSHA reasonably concluded that engineering and work practice controls could achieve the PEL in this industry within one year.

DBA relied heavily on Short's estimates of costs of compliance, though it did double-check these estimates and attempt—unsuccessfully—to obtain supplemental data from the industry. Short had estimated capital costs between $9 million and $26.8 million and annual costs of between $6.8 million and $13.1 million. Exh. 22 at 222. Relying on the one company that gave it supplemental cost data, DBA confirmed that capital costs could be as high as $30 million, Exh. 65B at 36, but found no reliable data for the cost of engineering controls, *id.* OSHA states that this DBA estimate is inflated because it includes the cost of meeting another OSHA standard, the chromate standard, and because, lacking data on engineering controls, the estimate assumes the costs of compliance will be solely due to expensive work practice controls. 54507/2. While its reasons for discounting the DBA estimates are not explained in persuasive detail, in the absence of contrary industry evidence suggesting the industry cannot afford these controls we will uphold OSHA's finding of economic feasibility here.

Wallpaper manufacture. As in the ink industry, lead exposure in wallpaper manufacturing occurs chiefly when workers handle dry pigments in dispersing pigment powder into oils and solvents. Once the pigment becomes part of the liquid the problems essentially disappear. Exh. 65B at 33. DBA learned that about half the 40 plants whose firms comprise the Wallpaper Manufac-

turing Association still use dry pigments. *Id.* Neither the WMA nor its members offered OSHA's consultants any air monitoring data. A few firms did report that they used exhaust ventilation and respirators to reduce exposure. *Id.* DBA generally suggested that local exhaust ventilation and better housekeeping could meet the 100 ug/m^3 level. In finding the standard technologically feasible for this industry OSHA relied on DBA's recommendation of non-respirator controls and its implication that plants now using dry pigments could replace them with other, less noxious pigments. 54492/3. Once again, DBA's evidence is sketchy, but the sketchiness may well be the fault of the industry, and in the absence of contrary evidence we uphold OSHA's finding here.

The firms were almost equally unavailing in supply cost data, but one firm did say the cost of compliance with the proposed standard would be minimal, and others told DBA that another OSHA standard, that for chromates, posed a much greater economic threat. Exh. 65B at 34. Beyond that, DBA could not add anything to Short's cost analysis. This is one of the industries for which the OSHA Preamble does not offer a separate analysis of economic feasibility, but we do not find that flaw decisive. The general discussion of economic feasibility for those industries, 54507/3-54508/1, presents a fairly detailed overview of how DBA attempted to supplement Short's findings on costs of compliance. While we think OSHA should have given each industry a paragraph of separate treatment, this section is not. like the lump-sum discussion of technological feasibility for certain "other industries," 54493/3, terse and conclusory. Moreover, here DBA explains precisely what it could or could not add to Short's analysis and, once again, the paucity of evidence is likely due to the industry itself. We find that OSHA has acted on the best available evidence here, and we uphold its finding that the industry can meet the PEL in a single year.

Can manufacture. Exposure exists for between 1,000 and 2,000 workers in this industry when they monitor machines that use solder to close the seams on cans. Though exposure data was limited, two companies reported minuscule levels, .002-0.4 ug/m^3, where ventilation controls worked properly. An OSHA inspection report found levels just slightly over the PEL, but only when the ventilation was faulty. Exh. 65B at 19-20. OSHA could easily conclude that the simplest engineering and work practice controls could relieve any exposure problem here, and DBA found that the costs, attributable almost wholly to simple housekeeping and training improvements, would be insignificant. Exh. 65B at 20; 54507/1. We affirm the agency's conclusions here.

Printing. The printing industry uses lead chiefly in the preparation of hot-metal type. Even here, hooding and ventilation appear to have reduced exposures below the final PEL for about 80 percent of all exposed workers, Exh. 22 at 196, with the remainder exposed to levels under 100 ug/m^3. These facts alone suggest that conventional improvements in these controls should eliminate the exposure problem. But, equally important, the dominant trend in at least the newspaper industry is to replace hot-metal type with cold type, which would eliminate the problem altogether. Exh. 65B at 20. OSHA thus has ample evidence to conclude that the PEL would be technologically practical within a year. 54493/1-2.

DBA relied on this trend toward cold type in revising Short's first-year cost estimate for meeting the 100 ug/m^3 PEL from $31 million to $20 million. Exh. 65B at 20. DBA found there would be no capital investment costs since engineering controls are generally in place. Though the $20 million figure may seem high, it translates into only $183 per worker in this vast industry and should steadily decrease as the number of workers exposed to hot-lead-type preparation steadily decreases. The esti-

mates for the 100 ug/m³ level seem readily applicable to the final PEL in such a low-exposure industry. We affirm OSHA's conclusions here.

Solder manufacture. Solder, for which there is no known substitute, is essential for electronic devices and other products. Exh. 65B at 40-42. About 3,500 workers in 120 plants suffer lead exposure during its manufacture, with exposures reported above the PEL in spooling, casting, powder blowing, and kettle and furnace areas. *Id.;* Exh. 22 at 294. Most employers use such conventional control devices as exhaust fans, vent ducts, and baghouses, and, where necessary, respirators. *Id.*

OSHA's chief evidence for technological feasibility is Short's report of statements by eight unnamed companies that the proposed standard would be feasible. Exh. 22 at 297-298; 54491/1. This evidence is questionable. In fact, Short reports superficially favorable comments from only four of these eight companies, and some of these comments may be misleading. One firm reports "no lead hazard," *id.* at 297. If this means the firm has low lead exposures, its comment is irrelevant to an industry in which even OSHA concedes exposures are generally high. The other three favorable comments state that the standard is "no problem" or poses "no difficulty." *Id.* at 293-294. But those comments, of course, went to the proposed lead standard which not only had a PEL of 100 ug/m³, but which may have been construed by the firms as liberally allowing supplemental respirators. And we note again that Short found some respirator use in the industry. *Id.* at 295. Moreover, DBA's supplemental analysis of the costs of compliance for this industry notes that true costs remain uncertain "since industrywide exposure levels are not known, [nor do we know] how effective engineering controls would be * * *." Exh. 65B at 42. Thus Short's eight-firm sample is especially suspect, as is OSHA's confident assertion that the engineering and

work practice controls which Short generally mentioned as means of reducing lead exposure (without predicting what PEL they could achieve), Exh. 22 at 295; 54491/1-2, could meet the final PEL within one year.

We thus do not find substantial evidence for the standard's technological feasibility for solder manufacturing. We remand the feasibility question for this industry, noting that OSHA offered no specific evidence or analysis of the standard's economic feasibility for this industry.

Wire patenting. Wire patenting is the art of quenching ferrous wire to give it high tensile strength and other desirable properties.[164] The wire moves through a pot of molten lead, and lead flakes accumulate during coiling of the wire and handling and storage of processed coils. Exh. 65B at 22. DBA estimated 2,000 workers in patenting plants face exposure, with air-lead levels likely ranging between 100 ug/m^3 and 200 ug/m^3. *Id.* OSHA inferred from the DBA report and its admittedly limited data that aggressive engineering controls and work practices could meet the 100 ug/m^3 standard. It also pointed to the Stelmor process, described by both Short and DBA, which would replace wire patenting by quenching the wire with air rather than molten lead. *Id.*; 54492/3. OSHA rather glibly states that this process is an alternative to conventional engineering controls as a means of meeting the 50 ug/m^3 level. Unfortunately, OSHA neglects to mention that both Short and DBA stated that the Stelmor process, though now in use in 25 plants, could not generally replace wire patenting in less than *eight to ten years.* Exh. 65B at 22. Perhaps OSHA believes

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[164] We will follow OSHA in treating wire patenting as a separate industry among the iron and steel industries. Such other sub-industries as terne metal and steel alloy manufacture fall within the remanded group of industries that received no separate treatment from the OSHA Preamble or the DBA Addenda. *See* note 162 *supra.*

it can speed up this replacement, but it does not explain how the Stelmor process can enter general use within a single year. Though OSHA does treat the Stelmor process as an *alternative* means of compliance, it appears to rely on the process heavily, and its reference to conventional controls is vague and conclusory. We thus will remand the questions of technological and economic feasibility for this industry.

Pottery industries. The pottery industry, consisting of a few very large firms and a great number of small ones, presents exposure problems in the handling and application of lead-based glazes in the manufacture of such products as earthenware utensils, china, and porcelain electrical devices. Exh. 22 at 211. Though exposure data was limited, from 1,000 to 10,000 workers may be exposed to air-lead levels as high as 200 ug/m^3. *Id.* Use of low solubility glazes, the lead from which is hard for the body to absorb, promises some protection to workers. *Id.* And OSHA relies for its finding of technological feasibility on DBA's recommendation of conventional engineering and work practice controls to meet the PEL. 54493/2; Exh. 22 at 212. DBA had little to add to Short's survey of the industry, and indeed conceded that little is known about the extent of exposure in this rather inchoate group of manufacturers. Exh. 65B at 47. We frankly find OSHA's conclusions on this industry a bit premature. OSHA has accepted Short's indications of widespread high exposure, but DBA did nothing to help document the likely places exposure will occur and the difficulties the industry will encounter in lowering it. We remand this industry for reconsideration of feasibility, so that OSHA can remedy the vagueness of the survey it has presented.

10. *Feasibility of medical removal protection.* The boldest new substantive provision of the lead standard, the medical removal protection program, requires a

separate feasibility inquiry. MRP would violate the statute if it threatened removal of so many workers that it might wreck the economic stability of an industry. And the economic feasibility question for MRP might at first seem an exceptionally difficult one: since the number of removed workers will depend on the success of employers in installing controls that reduce lead exposure, predicting the number and nature of the removals may appear to require speculation built on speculation. But OSHA's extremely thorough analysis of the practical effects of MRP clearly supports the feasibility of this provision, and indeed suggests that it will threaten severe economic harm only to those employers who through incompetence or intransigence fail to act vigorously to reduce exposures. 54451/1-54460/2.

We have already explained the complex timetable by which OSHA intends to phase in MRP. *See* text and notes at notes 56-62 *supra*. The most striking and important fact about this timetable is that OSHA has been careful to avoid dealing excessive harm to employers, and to give employers a reasonable opportunity to get a head start in reducing lead exposures, by implementing MRP very gradually.[165] OSHA fully recognized that immediate implementation of MRP might be devastating in the major lead industries, since current blood-lead levels in those industries are so high that the final MRP standard, if immediately implemented, would require removal of 25 to 40 percent of all exposed workers, 54452/2-

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[165] The one exception to the gradual phase-in is the rule requiring immediate removal of any employee who, according to a physician's diagnosis, might suffer manifest physical harm if he continues to be exposed to lead. Section 1910.1025-(k) (1) (ii). We agree with OSHA, however, that few workers will require removal for this reason. 54459/3. Moreover, it would be unthinkable for OSHA to allow employers to keep workers with actual lead poisoning in high-exposure worksites, whatever the cost of doing otherwise.

54457/1 (showing tables culled from record evidence). The most important cause of these extremely high current blood-lead levels is the failure of employers to meet even the fairly liberal current PEL of 200 ug/m³. Thus OSHA was justified in concluding that once employers, coerced and encouraged by the new standard, began installing new controls, blood-lead levels would begin to decline dramatically and the number of workers requiring removal would pose a steadily decreasing economic problem for employers. Most significantly, even where the standard gives employers a number of years to meet the final PEL through engineering and work practice controls alone, and even where employers find installation of such controls technologically or economically difficult, the standard requires that all employers immediately lower air-lead levels to 50 ug/m³ with supplemental respirators. Meeting just this modest and relatively undisputed part of the standard will itself quickly and sharply reduce blood-lead levels, as will correcting the common but inexcusable failures of hygiene and housekeeping that OSHA found throughout the lead industries. 54457/1 (citing evidence).

OSHA proceeded to estimate the number of workers who will require removal at each stage of the phasing-in of MRP and the likely cost to the industry of such removals, 54457/2-54460/1, relying on the report of its consultant on this issue, the Center for Policy Alternatives, Exh. 439A. At each stage OSHA presented more than substantial evidence that the economic effect will be modest at most. For example, the first stage of MRP requires immediate removal, on the effective date of the standard, of workers with blood-lead levels of over 80 ug/100g. Such workers comprise from three to 16 percent of exposed workers in the major lead industries. 54457/2. OSHA noted that many of these workers may already be on removal status under current employer

policies. But even if they all had to be removed, the disruption to the industries will not be great, since under the MRP standards for the first year such workers can be transferred to any workplace where the air-lead level —without resort to respirators—is under 100 ug/m^3. OSHA found that such transfer opportunities were abundant, *id.* (citing record evidence), and CPA's estimates for the costs of this removal—barely a million dollars in the first year for all the major industries combined, Exh. 439A, Table 7.1—suggest minimal economic harm. 54457/3.

OSHA offered similarly detailed estimates for the three later stages of the MRP phase-in, finding at each stage that the predicted continuing decline in blood-lead levels resulting from enforced reductions in air-lead levels would restrict the number of employees requiring removal. 54457/3-54459/1. Moreover, OSHA stressed that natural attrition among employees would itself reduce the number of workers requiring removal. That is, there is some correlation between length of job tenure and blood-lead level, and as the most senior employees—the ones likely to have the highest blood-lead levels—retire year by year, the number of workers with blood-lead levels over the MRP maximums will steadily drop. 54459/1.

OSHA and CPA concluded that, where employers make good-faith efforts to comply with the lead standard, no more than two percent of the exposed work force should be on removal status at any one time after the first year. 54459/1. CPA used that figure as the basis for estimating the direct annual costs of such removal to the major industries. The figures reveal that the per-industry costs will range from only $84,672 to $623,260, which means that no industry will suffer costs greater than two-tenths of one percent of its annual cash flow. Exh. 439A at 6-179. CPA also estimated costs for removals which

actually resulted in layoffs for one percent of exposed workers and transfers for the other one percent. *Id.* Though the cost estimates obviously increased in this situation, in no cases did the figure exceed three-quarters of one percent of annual cash flow. Thus OSHA had ample evidence to conclude that MRP was economically feasible.[166]

11. *Overlap with EPA regulations.* One final question of feasibility merits brief discussion. Only a month before OSHA issued the lead standard the Environmental Protection Agency issued its National Ambient Air Quality Standard for lead. 43 FED. REG. 45246 (1978). We recently upheld the new EPA standard in *Lead Industries Ass'n, Inc. v. EPA, supra.* LIA argues that the new OSHA lead standard must be struck down because the agency, in considering the feasibility of the standard, did not assess the cumulative or overlapping effects of the OSHA and EPA standards. We reject LIA's argument.

OSHA made clear in its Preamble that its concern was the feasibility of its own lead standard, but that it would treat *known* costs of other government regulations as part of its measure of the economics of a given industry. 54404/1. The costs of the new EPA standard,

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[166] OSHA concedes that removal may pose a somewhat greater problem for small employers who have less flexibility in creating transfer opportunities. 54460/2. Such employers, however, may have the counterbalancing advantage of greater ability to monitor closely their operations and workers, and OSHA had evidence that some small firms had been exceptionally successful even before the standard was issued in reducing exposures below the levels triggering removal. *Id.* In any event, unless these small firms faced extinction *and* their extinction threatened the competitive structure of an industry, their economic difficulties in complying with MRP could not prove the provision infeasible. *See* text and note at note 108 *supra.*

however, could not be known at the time of the OSHA rulemaking. The Clean Air Act, under which EPA issued its new standard, does not require any proof that a national air quality standard is technologically or economically feasible. *See* 42 U.S.C. § 7408(a)(2) (Supp. II 1978). Moreover, the states themselves carry out the EPA standard according to their own implementation plans. *Id.* § 7410; *see Union Electric Co. v. EPA*, *supra*, 427 U.S. at 266. Since a state is free to select "whatever mix of control devices it desires," *id.*, OSHA, forced to act on the best *available* evidence, could hardly predict the sum of the costs and effects of 50 state plans. Moreover, to speak of cumulative costs may well be misleading. Some control devices which reduce ambient lead outside the plant, and thus satisfy the EPA standard, may well also control airborne lead at its source within the plant and thus satisfy OSHA. In any event, if and when OSHA or the petitioners here manage to produce fairly precise estimates of the costs or effects of the state implementation plans created under the EPA standard, the agency, as we have noted at length earlier, retains ample means for adapting to any new information that may alter the feasibility of the standard. *See* Part VI-C-2 *supra*. Moreover, the OSHA and EPA have already embarked on a plan to mesh their plans for enforcing their standards, Letter from Douglas Costle, Administrator of EPA, and Eula Bingham, Assistant Secretary of Labor for Occupational Safety and Health, to National Association of Recycling Industries, December 17, 1979, and this plan should enhance the ability of both government and industry to tailor the OSHA lead standard and industry compliance activities to the emerging burdens of new regulations.

VIII. Union Arguments

We have saved for the end of this opinion our consideration of labor union arguments that the lead stand-

ard is insufficiently stringent, because we believe our discussion of the industry claims places the union challenges in clearer perspective. The union challenges take different forms, but collectively they amount to a charge that OSHA has violated its statutory mandate to ensure that *no* worker suffer material impairment of health.

United Steelworkers of America (USWA) argues that OSHA set its blood-lead level goal, final PEL, and action level too high. Though USWA suggests no specific lower figure for the action level, it does argue that the agency should have aimed at a general blood-lead level of 30 ug/100g rather than the 40 ug/100g level it chose, *see* Part V-C *supra*, and that OSHA should, as a mathematical consequence, have set its final PEL at 40 ug/m^3 rather than 50 ug/m^3. We agree with the union that OSHA, after finding that blood-lead levels above 40 ug/100g threaten worker health, set a final PEL of 50 ug/m^3 that will leave as many as 29.3 percent of affected workers with blood-lead levels over 40 ug/100g, and that OSHA also found that lead might cause harm to workers' reproductive organs at levels as low as 30 ug/100g. But we find two rather obvious flaws in USWA's conclusion that OSHA has thereby violated its statutory responsibility.

First, the union arguments prove too much. Even the PEL preferred by the union, 40 ug/m^3, would leave as many as 24.2 percent of affected employees with blood-lead levels above OSHA's goal of 40 ug/100g. 52972/2. Thus USWA reads the statute no more literally than does OSHA. In any event, the agency acted reasonably in concluding that the five percent difference in the number of workers above the blood-lead level goal may be within the margin of normal error for such measurements. *Id.*

Second, and more obviously, USWA's arguments for a lower PEL and action level pay little respect to the feasi-

bility problem. We have already explained in exhaustive detail the great discretion the statute affords OSHA in determining the feasibility of a chosen PEL. *See* Part VI-C *supra*. Moreover, in examining the feasibility of this very stringent standard for specific industries we found it necessary to exercise considerable deference to the agency to uphold some of its conclusions, while rejecting several feasibility findings as lacking substantial evidence. In such a situation we cannot find much merit in the charge that OSHA acted irrationally or without substantial evidence in refusing to find a still more stringent PEL technologically and economically practical.

The Oil, Chemical and Atomic Workers International Union (OCAW)[167] makes two arguments that fail on essentially the same grounds. It argues that OSHA impermissibly delayed full implementation of the PEL in the pigment industry for five years and impermissibly delayed full implementation of the medical removal provision for all industries. The short answer to the first argument is that, since OSHA lacked substantial evidence to prove the 50 ug/m^3 PEL feasible for the pigment industry, we rather obviously cannot hold that a more stringent standard would have been feasible. As for the second argument, we have upheld OSHA's conclusion that the medical removal provision as presently drawn is feasible, acknowledging OSHA's great discretion where precise economic projections are impossible. *See* Part VII-B-10 *supra*. We can hardly turn around and tell OSHA that it should have made this extremely innovative and

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[167] OSHA has challenged OCAW's standing to raise these issues, claiming that OCAW's arguments are illegal enlargements of the issues by an intervenor. OCAW responds that this appeal challenges the entire lead standard, and that it therefore is not enlarging the issues. We will assume for the moment that OCAW does have standing, proceeding to reject its claims on the merits.

undeniably expensive provision still bolder and more expensive.

There remains, though, one ironic twist to OCAW's claims on these issues. OCAW argues that in choosing to phase in the medical removal provision gradually OSHA was concerned not only with ensuring that the provision was feasible, but also with *minimizing* costs to employers. Thus, OCAW argues, OSHA effectively performed a cost-benefit balancing test on MRP in violation of the statutory requirement that OSHA protect workers as well as it can within the limits of feasibility alone. The irony, of course, is that OSHA has itself argued against the propriety and necessity of cost-benefit tests under the OSH Act for any part of the standard, and, citing our recent decision in the cotton dust case, we have unqualifiedly agreed. *See* note 102 *supra.* OCAW rightly notes that OSHA, in justifying the medical removal provision as feasible, uses such misleading words with regard to the cost of the MRP as "minimal," 54452/1, or "trivial," 54459/2. But we do not construe a few casual adjectives as amounting to an arguably improper cost-benefit test, especially when OSHA has expressed its vigorous opposition to such a test. Moreover, OSHA had to assess the economic effect of this particular provision in light of the economic feasibility of the standard as a whole, and no provision of the standard, viewed in that context, is trivial or minimal in its economic effect.

The one OCAW argument that merits somewhat fuller discussion is that OSHA's decision to exempt the construction industry from the lead standard violates its statutory responsibilities. We agree with the union that OSHA's decision to exclude the workers in one industry from the standard requires some explanation, since the statute requires OSHA to protect all workers. But we think OSHA has provided that explanation. Essentially,

OSHA found that to apply the lead standard to the construction industry would be infeasible and illogical, since the construction industry differs from other industries with lead exposures in several important ways. 52986/1. Specifically, construction work exposes employees to lead only for very brief periods, normally requires employees to move constantly from place to place, creating widely varying lead exposure that defies normal measurement, and has an unusually high number of temporary employees. *Id.*[168] OSHA went on to explain these problems in some detail, citing ample record evidence.

Thus OSHA found that it would be highly impractical to conduct environmental monitoring in the construction industry, since this monitoring works well only for fairly regular activities in fixed places. 52986/2; JA 1284 (Boeing). As a worker moves from place to place—frequently in outdoor workplaces where the weather poses an extreme variable—environmental monitoring becomes irrelevant to his health. OSHA reasonably concluded that the variability of worksites would also render the medical surveillance scheme of the standard less useful, since that scheme depends heavily on environmental monitoring. *See* text at note 99 *supra.*

Perhaps more important, one of OSHA's two preferred means of compliance with the standard, use of engineering controls, is especially infeasible for construction work. There may be no practical way to apply engineering controls to such activities as abrasive blasting or mobile work. Moreover, the design, installation, and amortization of even conventional controls, like exhaust

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[168] The same problems may arise with one other industry, telecommunications, which OSHA did not exempt from the standard. However, since telecommunications is one of those industries we have remanded for reconsideration of the feasibility of the standard, that question can remain open in the agency. *See* note 162 *supra.*

ventilation, are impractical for short-duration construction jobs, since these tasks are likely to take longer than the jobs themselves. 52986/2; JA 1410-1412 (National Constructors Association). Work practice controls may be equally infeasible for construction: Hygiene facilities requiring water, and mobile change rooms, eating spaces, and lockers may be prohibitively expensive for many remote or short-term jobs. 52986/2; JA 1329 (Council of Construction Employers). Finally, the exceptional turnover rate in this industry, JA 1105 (Milor), and the custom of subcontractors hiring local craftsmen from local unions for brief periods, JA 1110 (Milor), mean that workers in this industry cannot benefit from the medical removal provision since they may not be on contract for a job long enough for removal by a given employer to be possible and since removal in turn depends on biological monitoring over an extended period of time in a given place. 52986/2-3.

Of course, OSHA would be shirking its statutory responsibilities if it made no effort to protect workers in the construction industry from lead exposure. But we construe OSHA's decision here as one only to exempt the construction industry from this *particular* standard, not from OSHA jurisdiction generally. *Industrial Union Dep't, AFL-CIO v. American Petroleum Institute, supra,* 48 U.S. L. WEEK at 5037 (Burger, C.J., concurring) (OSHA can act in its legislative capacity "to focus on only one aspect of a larger problem"). The agency has stated that it has requested its Construction Advisory Committee to review the rulemaking record and to recommend how the agency might fashion a scheme to give construction workers the protection they need. 52986/3. We have no reason to doubt OSHA's assurance that it will take reasonably prompt steps to fashion this protection. So long as it does so, OSHA has met its duty. Nothing in the Act prevents the agency from exercising discretion in delaying specific standards according to the

unique problems of specific industries. *Nat'l Congress of Hispanic American Citizens v. Usery*, 554 F.2d 1196, 1199 (D.C. Cir. 1977); *see Nat'l Roofing Contractors Ass'n v. Brennan*, 495 F.2d 1294, 1299 (7th Cir. 1974). In the meantime, other OSHA regulations now in effect will protect construction workers against general air contamination through engineering, work practice, and respirator controls. *E.g.*, 29 C.F.R. §§ 1926.55, 1926.57, 1926.103, 1926.354(c) (1979).

IX. Summary

The disposition of these petitions is as follows:

1. The rulemaking leading to the new lead standard was free of procedural error.

2. The substantive provisions of the lead standard, including the medical removal protection program, the multiple physician review program, and the rules governing access to medical records, fall within the scope of OSHA's statutory power and are reasonable exercises of that power.

3. OSHA presented substantial evidence for its decision that a Permissible Exposure Limit of 50 ug/m^3 was necessary to prevent material impairment of employees' health.

4. OSHA presented substantial evidence for the feasibility of the lead standard for the following industries: primary lead smelting, secondary lead smelting, battery manufacture, electronics, gray iron foundries, ink manufacture, paints and coatings manufacture, wallpaper manufacture, can manufacture, and printing. For these industries the standard shall go fully into effect.[169]

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[169] All pending motions from parties representing these industries which request modifications of the stay or any relief from the standard on grounds of infeasibility are hereby denied.

5. OSHA failed to present substantial evidence or adequate reasons to support the feasibility of the standard for the following industries: nonferrous foundries; pigment manufacture; shipbuilding; auto manufacture; solder manufacture; wire patenting; pottery; brick manufacture; agricultural pesticides manufacture; leather manufacture; pipe galvanizing; gasoline additives manufacture; linoleum-rubber-plastics manufacture; paint spraying; ammunition manufacture; smelting and refining of zinc, silver, gold, platinum, copper, and aluminum; machining; lead burning; glass manufacture; textile manufacture; book binding; steel alloy manufacture; terne metal manufacture; glass polishing and spinning; cutlery manufacture; diamond processing; plumbing; jewelry manufacture; pearl processing; casting; cable coating; electroplating; explosives manufacture; lamp manufacture; sheet metal manufacture; tin rolling; telecommunications; and independent collecting and processing of scrap lead (excluding collecting and processing that is part of a secondary smelting operation).

We remand the record to the Secretary of Labor for reconsideration, in the light of this opinion, of the feasibility of the standard for the industries listed in the previous paragraph. The Secretary shall return the record on the feasibility of the standard for these industries, with sufficient evidence and fuller explanation, within six months of the issuance of this opinion. In the interim one portion of our March 1, 1979 partial stay of the lead standard shall remain in effect: For those industries listed in the previous paragraph the stay of Section 1910.1025 (e) (1) of the standard, which requires compliance with the PEL by engineering and work practice controls, shall remain in effect. These industries, however, shall be immediately required to meet the PEL of 50 ug/m^3 by some combination of engineering, work practice, and respirator controls.

All other provisions of the March 1, 1979 partial stay are hereby lifted. This court shall retain jurisdiction of the case.

So ordered.

MACKINNON, *Circuit Judge* (Dissenting): While the massive record in this case and the extensive majority opinion indicate that a tremendous amount of very thoughtful study and consideration has been given to the many issues involved, it is my view that a number of bases were not properly touched. Hence the agency is not "home free." The case should accordingly be remanded: (1) to correct the improper use of consultants, (2) to issue a proper Notice of Rulemaking on the 50 ug/m^3 standard and conduct a proper hearing thereon with right of cross-examination, (3) to produce substantial evidence, subject to cross-examination, that properly supports the feasibility of the standard for "Other Industries" which was not done in The Short Report, (4) to strike the medical removal protection system because it directly violates the prohibition of the act against "supersed[ing] or in any manner affect[ing] any workmen's compensation law," (5) to hold further hearings on the feasibility of the standard imposed because it is not presently supported by substantial evidence and violates the holding in the recent Benzene Case, *Industrial Union Department, AFL-CIO v. American Petroleum Institute*, —— U.S. ——, 48 U.S.L.W. 5022 (July 2, 1980) by relying on impermissible presumptions, (6) to employ proper methods as outlined hereafter in determining the feasibility of the lead standard, and (7) to make a cost-benefit analysis to determine if the evidence supports a finding of significant benefits derived from economic feasibility.

I. IMPROPER USE OF CONSULTANTS

Subsequent to the close of the record in this rulemaking, and prior to the promulgation of the final standard, OSHA contracted with outside consultants to perform an evaluation, presumably only of record evidence,[1] on

[1] Without a review of the actual reports submitted by the consultants, which are not available, it cannot be determined

two topics. First, the agency asked David Burton and David Burton Associates (DBA) to review the voluminous record and evaluate the feasibility of a permissible air-lead exposure standard of 50 ug/m³. The rule as proposed in the notice,[2] and virtually all of the record evidence, referred only to the feasibility of a permissible exposure limit of 100 ug/m³. Burton and DBA had previously prepared reports for OSHA which had been introduced into the record, and *had testified as expert witnesses during the public hearings in support of the economic and technological feasibility of the 100 ug/m³ proposed level.* After the record was closed the agency also contracted with the Center for Policy Analysis and Nicholas Ashford to analyze the scientific and medical correlation between air-lead and blood-lead levels. Ashford had submitted a preliminary report on this correlation during the record period as an expert witness for OSHA. The lengthy analyses prepared by the consultants in fulfillment of their contractual responsibilities have

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whether or not they contain new, extra-record evidence. The majority reads vague statements from the contracts which designate the evaluating responsibilities of DBA and CPA, and concludes that only record evidence was to have been reviewed to formulate their analyses. However, far too little weight is given to the statement in the CPA contract to the effect that the consultant was permitted "to conduct additional research and prepare material supplementary to the above testimony . . ." ALD 11; Majority Opinion at 42. This concern only magnifies the insuperable handicap with which the Court is afflicted by being forced to rule on the propriety of these reports, without ever seeing them. *This is a fatal defect in the record.*

[2] In this respect the Notice of Rulemaking on the exposure standard stated the issue to be:

> 1. Whether the proposed permissible exposure limit to lead should be 100 ug/m³: and whether this level incorporates an appropriate margin of safety;

40 Fed. Reg. 45934/1-2 (1975).

never been released to the parties or the public, despite the fact that as far as the report on the economic and technological feasibility of 50 ug/m^3 is concerned, it is the only in depth evidence on the topic in existence. The delegation of this task to these biased witnesses, and the failure to introduce the reports into evidence, constitute prejudicial error which requires the remand of the case to the agency on this point. As Chief Justice Hughes remarked in *Morgan v. United States*, 298 U.S. 468, 480 (1936) (*Morgan I*), "[n]othing can be treated as evidence which is not introduced as such." In the absence of this report there is insufficient evidence to support the finding.

The majority is correct in the first part of its section addressing the use of outside consultants, in concluding that they may be hired to aid the agency perform many of its tasks. See 29 U.S.C. § 656(c) (1976). However, fundamental requirements of fairness and due process in administrative law compel that these outside consultants to whom the agency delegates its obligation to evaluate the evidence must be unbiased and neutral in their evaluation of the record. Just as the actual decision-maker is to be unbiased, so must those to whom such duty is delegated. No court should condone allowing paid consultants to legally change their hats from expert witnesses subject to cross-examination during the hearings, to "agency staff" hired after the close of hearings to evaluate the credibility of *their own testimony* and others. Their positions as prior witnesses, because of implicit bias, disqualifies them from passing on the probative value of their testimony as a witness vis-á-vis that of the other witnesses. By having testified as advocates during the hearing on one side of a highly contested issue, their later intra-agency tasks taint the end product.

In addition to the fact that OSHA utilized biased staff, this practice is prejudicial because the consultants were not subject to cross-examination on the secret reports they subsequently developed. According to the agency's own regulation, "fairness may require an opportunity for cross-examination on crucial issues." 29 C.F.R. § 1911.15(a)(3) (1979). In addition, the regulations mandate that "[t]he presiding officer shall provide an opportunity for cross-examination on crucial issues." 29 C.F.R. § 1911.15(b)(2) (1979). Subjecting these consultants to cross-examination initially, and then giving them free reign to evaluate and weigh all contrary testimony, is in effect giving them free and unbridled rebuttal without the benefits that might flow from cross-examination. And OSHA cannot contend that the substance of these secret reports does not relate to "crucial issues" because they go to the very core of the standard.

Various other points in this section of the majority opinion must be addressed. First, the majority condones OSHA's use of the consultants because the Lead Industries Association (LIA) allegedly failed to prove material prejudice by identifying "hard data or new legal arguments which are contained only in the allegedly improper *ex parte* communications and on which OSHA demonstrably relied in setting the standard." Majority Opinion at 29. The majority is asking of the petitioners the impossible, when all they were allowed to examine were the contracts executed for hiring the consultants, and some ambiguous lists prepared pursuant to *Vaughn v. Rosen*, 484 F.2d 820 (D.C. Cir. 1973), *cert. denied*, 415 U.S. 977 (1974) in response to a request under the Freedom of Information Act. However, by examining the dearth of evidence on the 50 ug/m^3 standard, one easily realizes that the DBA report must have had some relevant information in it for it to provide the agency's justification for promulgating the lead standard at the 50 ug/m^3 level.

Secondly, the majority relies on the Second Circuit's opinion denying the Lead Industry Association's Freedom of Information Act request for release of the secret studies, as evidence that these reports were intra-agency reports which need not be disclosed. *Lead Industries Ass'n, Inc. v. OSHA*, 610 F.2d 70 (2d Cir. 1979). That opinion has no persuasive value for the instant case. That records may not be required to be disclosed under the Freedom of Information Act does not decide whether substantial evidence exists to support a standard adopted in legislative rulemaking proceedings. Also, the legal standard for exemption of intra-agency memoranda bears no relationship to the legal problems existing here, relative to tainted consultants, and lack of proper cross-examination. Those issues were not directly before Judge Friendly in the Second Circuit case.

Finally, the cases cited by the majority fail to support its end conclusion upholding OSHA's action. For instance, in *Doe v. Hampton*, 566 F.2d 265 (D.C. Cir. 1977) this Court reviewed an appeal from an administrative review of the firing of a civil servant. In the administrative review, albeit labelled an "adjudicatory" review, *id.* at 269, the agency communicated with a Dr. Eck for his medical opinion on the record evidence about the terminated employee. This Court held that this was not a mere "assembling of the files", or an "appropriate use of assistants". *Id.* at 276. Instead, it was an additional medical evaluation of record evidence upon which the Appellant had already had a full and fair opportunity to comment. *Id.* at 277. The doctor's report went to the essence of the validity of the decision. As such, proper procedure required that the parties have an opportunity to review the report and to comment upon it. The Court concluded that the delay that would have occurred in allowing the further comments is a cost that would "be more than counterbalanced by the benefits de-

rived from the appearance of a fairer adjudication of the merits." *Id.*

The majority cites *Doe v. Hampton* for the proposition that before *ex parte* comments will be excluded, a court must find material prejudice. Indeed, *Doe v. Hampton* concluded that no legal prejudice was exhibited because the doctor's report was merely cumulative of other evidence. However, the instant case exhibits clear and material prejudice in that the conclusions in the secret reports were *not* cumulative of the record evidence. They may have included extra-record evidence, and they certainly go to the very essence of the newly promulgated lead standard at the 50 ug/m^3 level.

The instant case is also much like *United States Lines v. FMC*, 584 F.2d 519 (D.C. Cir. 1978), also cited by the majority. Assuming as I do that the prior witnesses were not proper and unbiased agency staff when they were hired as consultants to aid the decisionmaker, I must disagree with the majority's conclusion that *United States Lines, Inc., supra*, is inapplicable. See Majority Opinion at 30. It is *very* applicable. As we stated there:

> "The agency's secrecy as to the *ex parte* communications is particularly troublesome in this case. For what we do know about the course of the agency's decisionmaking suggests that these communications were vital to the agency decision. This necessarily calls into question whether the justifications put forth by the agency in its decision were in fact its motivating force."

Id. at 541. Recognizing the role of the court in performing a searching and careful review of the record as mandated by the Supreme Court in *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402 (1971), we held in *United States Lines, supra*, that we were precluded from doing so because of the secret communications. Even had the contents of the *ex parte* communi-

cations been revealed on judicial review, *United States Lines* holds that there would still have been a deprival of adversarial comment on them. 584 F.2d at 542. Finally, we cited *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council*, 435 U.S. 519 (1978) as supporting this conclusion.

> Nor does *Vermont Yankee* provide a basis for agency procedures or practices which effectively foreclose judicial review where, as here, such review is provided for by statute. Nothing in that decision calls into question the well established principle, found in the Administrative Procedure Act and in the decisions of the Supreme Court, that the court is required to conduct a "searching and careful" inquiry to determine whether agency action is arbitrary or capricious, or, in appropriate cases, supported by substantial evidence. *See* 5 U.S.C. § 706 (1976); *Citizens to Preserve Overton Park, Inc. v. Volpe*, *supra* note 40, 401 U.S. at 415-417, 91 S.Ct. 814. Indeed, the *Vermont Yankee* decision remanded the case to the Court of Appeals for just such an inquiry.

United States Lines v. FMC, 584 F.2d at 542 n.63 (D.C. Cir. 1978).

My conclusion on the issue of the subsequent use of prior witnesses as consultants may be summarized on two points: first, the agency has established a system for hearings and cross-examination that it is bound to follow. When it introduces experts as witnesses, subject to all the procedural rules, and then turns around and incorporates them onto their staff to review the same or similar issues, allowing them freely to contradict, and in secret, to oppose evidence given by others, the agency is effectively not complying with its own rules. In addition, the consultants' secret reports are colored by their prior role as advocates. Second, this practice by OSHA caused material prejudice, because there is virtually noth-

ing in the record regarding the issue of the feasibility of the 50 ug/m^3 standard except for these detailed, yet secret, reports. This Court is thereby precluded from performing a careful and searching review of the record to determine if the standard is supported by substantial evidence.[3]

II. The Notice of Rulemaking

The agency's failure to properly notify the public that it was considering such a stringent permissible exposure limit (PEL) as 50 ug/m^3 is the root of its troubles in this rulemaking. By instead resting on vague statements in the notice of proposed rulemaking, and perhaps the clairvoyance of the participating witnesses, OSHA received almost no evidence on the technological and economic feasibility of this ultimate permissible exposure limit. Because of this fatal flaw, the case should be remanded to the agency for further rulemaking, in which proper notice would be afforded the public to ensure its meaningful participation.

The law on this issue is clear. The notice of proposed rulemaking must adequately inform interested parties of the action to be taken. *American Iron & Steel Institute v. OSHA*, 577 F.2d 825, 830 (3d Cir. 1978), cert. granted, 48 U.S.L.W. —— (June —, 1980). The Fifth Circuit required that proposed rules, in their initial form, must "give[] sufficient notice to the interested parties of the Secretary's intentions." *Taylor Diving &*

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[3] A questionable conclusion by the majority also demands comment. It notes that the decisionmaker obviously demonstrated her independence from the consultants by strongly criticizing some of their conclusions on the key subject of feasibility. Majority Opinion at 28. The majority is indulging in a *post hoc* rationalization that fails to address the problems inherent in compiling and using the secret study at all. Indeed, as long as the report is secret, the Court is unable to reasonably analyze the credibility and weight that the decisionmaker gave the studies.

Salvage Co. v. Dept. of Labor, 599 F.2d 622, 626 (5th Cir. 1979). As noted by the majority, the final standard need not be identical to the proposed rule, *International Harvester Co. v. Ruckelshaus*, 478 F.2d 615, 632 (D.C. Cir. 1973), but it must be a "logical outgrowth" of the provisions found in the standard originally proposed. *Taylor Diving & Salvage Co. v. Dept. of Labor*, 599 F.2d at 626. Finally, the First Circuit held that the "procedural rules were meant to ensure meaningful public participation in agency proceedings, not to be a straightjacket for agencies." *BASF Wyandotte v. Costle*, 598 F.2d 637, 642 (1st Cir. 1979). As stated by this Court, the proposed rule "should be sufficiently descriptive of the 'subjects and issues involved' so that interested parties may offer informed criticism and comments." *Ethyl Corp. v. EPA*, 541 F.2d 1, 48 (D.C. Cir. 1976) (en banc), *cert. denied*, 426 U.S. 941.

Here the agency "proposed [a] permissible exposure limit [of] 100 ug/m^3. . ." [4] It never expressly stated it was considering or might consider the 50 ug/m^3 standard that it eventually promulgated. Very little evidence was submitted by the industry petitioners *or the agency* on any level but the 100 ug/m^3, or higher. *OSHA concedes that no evidence whatsoever was introduced on the economic feasibility of complying with the 50 ug/m^3 level.* Because of this, and after noting the thousands of pages introduced by all the parties, supporting both a stringent or lenient rule, and finding no evidence on the 50 ug/m^3 level, it is a plain absurdity to conclude that the parties were sufficiently informed to permit their meaningful participation in discussing the possibility that the proposed permissible exposure limit of 100 ug/m^3 would be reduced 50%.

A review of the vague statements in the notice of proposed rulemaking also points out that the 50 ug/m^3 PEL

[4] Note 2, *supra*.

is not a "logical outgrowth" of the proposed rulemaking at 100 ug/m³. See Majority Opinion at 35. Whether a 100 ug/m³ PEL would provide an appropriate margin of safety, considering the uncertainty of OSHA's scientific models and medical evidence, is a very open-ended question. Further, whether subclinical effects should be considered is also misleading since subclinical effects undoubtedly can appear at the 100 ug/m³ level in addition to lower exposure levels. This does not lead to a logical outgrowth that the proposed PEL should be cut in half. Finally, the extra consideration given to women of childbearing age most logically leads to the conclusion that special precautions, in the form of respirators or alternative work assignments, might be taken for these susceptible individuals, *not* that a definite level at 50 ug/m³ would be set.

However, one could accept the most liberal interpretations of these statements in the notice of proposed rulemaking *had they indeed produced any significant amount of evidence* at the 50 ug/m³ level. But no such evidence evolved. That no such evidence was offered by anyone during the extended hearings, especially considering the intensity of the participants' adversarial positions, constitutes the best support for concluding that the 50 ug/m³ level was *not* a "logical outgrowth" of the Notice of the Rulemaking proposal of a "100 ug/m³. . . level."

Finally, OSHA and the majority rely on a feeble and totally irresponsible rationale for upholding the adequacy of this notice. They assert and conclude that since the LIA and other industry petitioners took the position throughout the proceeding that the proposed 100 ug/m³ level was infeasible, then, *a fortiori*, they would likewise have claimed the 50 ug/m³ level was infeasible. Thus, why bother hearing their comments and evidence on the stricter level, for it would only be the same "in greater

volume or [stated] more vociferously." *BASF Wyandotte v. Costle*, 598 F.2d at 644.

This reasoning presumes that the evidence of feasibility for 50 and 100 ug/m^3 is interchangeable, and there is no way the decisionmaker could reach a different conclusion on the two. This presumes too much. One level may require an assortment of conventional engineering controls, while the 50 ug/m^3 level may demand total rebuilding of the workplace or dislocation of the entire industry. The cost may also increase disproportionately. Moreover, without any evidence of the cost and difficulties of complying with the 50 ug/m^3, how would the decisionmaker have the vaguest idea of its feasibility? Taking the majority's reasoning to its logical, albeit extreme, position one would have to conclude that OSHA could have reduced the PEL to 10 ug/m^3. By the agency's contention, the fact that OSHA may arrive at a lower PEL is allegedly forewarned by the notice of proposed rulemaking, and any evidence that the protestants would have introduced would have been the same; infeasibility would still be argued only more "vociferously." It is obviously absurd to compare the probative effect of evidence of infeasibility for 100, 50, or 10 ug/m^3 and state that the only difference is in the vocal force of the advocacy.

Therefore, since reasonable notice was not given, nor evidence received as to the 50 ug/m^3 level, and the majority's defense of such slipshod practice is wholly illogical, I would remand the case to OSHA for a rulemaking based on proper notice to the interested parties and the public. Thereafter, substantial *public* evidence would be required to support the agency's conclusion.

III. The Short Report

The majority upholds the acceptance of the Short Report over the objection of the American Iron and Steel Institute (AISI). Majority Opinion at 45-47. This Re-

port constitutes OSHA's principal support for the feasibility of the standard for the groups of companies referred to as the "Other Industries." I dissent from the ruling accepting this Report for two reasons: First, the agency failed to lay a proper foundation for the Report by not identifying the parties who had helped prepare it. Second, the agency caused the cross-examination of the known authors to be denied.

When a technical report is introduced into evidence, its author must be identified. This is necessary to permit comment and cross-examination by the public and interested parties. Identifying the author is essential in order to test the credibility of its format and substance. Yet in this case, the majority recognizes the correctness of AISI's contention that OSHA never informed the parties that David Burton and Associates helped prepare the Short Report, at least as to the section on the feasibility of compliance by the AISI member industries. Therefore the agency failed in a material respect to lay a proper foundation for receipt of the Report. The Report must accordingly be stricken from the record.

The greatest prejudice, in failing to identify the author of the report, occurs from the fact that OSHA thereby effectively denied the affected industries their right to effective cross-examination of the authors of the Report. It has already been established in part II that cross-examination is essential *under the agency's own rules* on crucial issues. The majority opinion in section III E concludes that the interpretation of the cross-examination regulation is a matter left up to the agency, and OSHA has "effectively interpreted" the regulation not to require the cross-examination of the authors of the Report. This simply is not true. As recognized by the majority, OSHA believed it had fulfilled its responsibility by introducing David Burton and his colleagues from DBA, but OSHA never identified them as the au-

thor of the report. Any true deferral to agency interpretation would require holding that the true authors must be cross-examined. The regulation, stating that there "shall" be cross-examination on crucial issues, is clear, and feasibility of compliance with the 50 ug/m^3 standard by the "other industries" is a crucial issue demanding the allowance of cross-examination of these authors. What kind of cross-examination is possible if the advocates do not even know that Burton participated in compiling the Short Report? Burton even denied knowledge of one of the most crucial aspects contained in this Report—economic feasibility for the "other industries." Thus, his credibility as a witness for the Short Report was eliminated. An administrative proceeding is not a party-game wherein the contestants must divine the identity of the mystery guest in order to win the door prize.

Therefore, because OSHA by its actions precluded effective cross-examination on the Short Report, I would remand the standard for all of the "Other Industries" that the Report addressed. Since the majority has also remanded to OSHA all of the standard based on only evidence contained in the Short Report, my position on this issue has little effect. However, the majority demands for reasons different from mine, and since I greatly disagree with its conclusion in III E, the foregoing comments are essential.

IV. Medical Removal Protection

Industry petitioners challenge OSHA's authority to promulgate the provision in the standard establishing the Medical Removal Protection (MRP) system. See 29 C.F.R. § 1910.1025(d), (j), and (k). This system at its most extreme limit requires the removal from their jobs of all employees exposed to lead levels exceeding the designated air-lead action level, and whose blood-lead

levels exceed prescribed amounts over three consecutive months. Under the authority of Section 1910.1025(k)(2), the employer may assign the removed worker to a low exposure job, or reduce his number of exposed hours on the same job to comply with the time weighted average calculated into the standard. If the employer is incapable of doing this, he must lay off the employee while still maintaining his full wage and seniority benefits for up to eighteen months. When the employee's blood-lead level has been reduced to a prescribed "safe" level, he must be returned to his original position. The union petitioners maintain that the feature of the system, whereby the worker retains his full salary and seniority for up to 18 months whether he works or not, is the *sine qua non* of the entire standard, for without this job security, employees would fail to comply out of fear of losing their jobs. The industry petitioners argue that OSHA is not authorized to impose such a system, and is also precluded by 29 U.S.C. § 653(b)(4). While agreeing with the agency and unions as to the benefits of the proposed system, I must agree with petitioners that it exceeds the authority conferred by the statute. I therefore dissent from the majority on this issue and would hold that the Medical Removal Protection system, insofar as it requires payment of full wages and benefits while the employee is laid off, should be set aside. If Congress supports such a system it should authorize it specifically and indicate that § 653(b)(4) does not prohibit it.

The agency in the lead standard has promulgated the most far reaching removal system of any OSHA standard ever reviewed. Therefore, there is little support in the cited case law.[5] It is noted, however, that the Fifth

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[5] Even the majority recognizes that the medical removal system in the Cotton Dust case is very "modest" compared to the one under review. Majority Opinion at 66 n.63; *AFL-CIO v. Marshall*, 617 F.2d 636 (D.C. Cir. 1979).

Circuit recently held that OSHA is not authorized to regulate job security. *Taylor Diving & Salvage Co. v. Dept. of Labor*, 599 F.2d 622, 625 (5th Cir. 1979).

More importantly, the OSH Act clearly indicates that the proposed system is unauthorized and contrary to the law or intent of Congress. The majority relies on various open ended and overly general congressional "authorizations" which assertedly permit this regulation. First, OSHA may assure "safe and healthful *working conditions* . . . by developing innovative methods, techniques, and approaches for dealing with occupational safety and health problems." 29 U.S.C. § 651(b)(5) (emphasis added). Second, the term "occupational safety and health standard" is statutorily defined as one which requires "conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment." 29 U.S.C. § 652(8). Third, the Act describes the manner in which the agency may regulate to warn employees of hazards to which they are exposed. In addition, the standards "shall also prescribe suitable protective equipment and control or technological procedures to be used in connection with such hazards. . ." 29 U.S.C. § 655(b)(7). Finally, the Secretary shall prescribe "such rule and regulations as he may deem necessary to carry out [his] responsibilities under this chapter. . ." 29 U.S.C. § 657(g)(2). By these statements, OSHA maintains that it can require removal of employees for up to eighteen months at full salary and seniority rights.

OSHA and the majority are reading far more authority into this Act than Congress ever intended it to have. The general impression gleaned from these provisions is that Congress was referring to the regulation of conditions *within the workplace*. The Act uses such terms as "working conditions", "places of employment",

and "control procedures . . . used *in connection with* [the hazards to which the employee is exposed]". The latter authorization is stated in the same phrase with "protective clothing", indicating that the control techniques are intended for application within the working environment. Congress never even hinted that the Secretary, by this language, could demand the medical removal program, which has nothing to do with providing safe "working *conditions*". In fact the MRP imposes no conditions whatsoever on the working place.[6]

The Supreme Court's recent discussion of the refusal of Congress to enact a "strike with pay" provision in the OSH Act is very instructive on this issue. *Whirlpool Corp. v. Marshall*, —— U.S. ——, 48 U.S.L.W. 4189 (Feb. 26, 1980). The majority's opinion attempts to distinguish or explain away clear statements by the *Whirlpool* Court, all the while inadvertently demonstrating how applicable it really is. Majority Opinion at 73-75 n.69. *Whirlpool* deals with a regulation promulgated under

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[6] Although a bare reading of the statute is sufficient to arrive at this conclusion, the legislative history of the OSH Act discussed by the majority also evidences the lack of congressional intent to authorize this regulation. Congress had discussed a form of "strike with pay" in the Daniels Amendment, and rejected it. H.R. Rep. No. 91-1291, 91st Cong., 2d Sess. 30 (1970). This Amendment was distinguishable from the MRP, but in many respects its affect on the employer, i.e. having to pay for laid off employees, is comparable. And Congress refused to authorize this.

In addition, weight must be given to the fact that only one year prior to the enactment of the OSH Act, Congress enacted the Federal Coal Mine Health and Safety Act of 1969, 30 U.S.C. § 801 *et seq.*, which *did* expressly authorize a removal program. 30 U.S.C. § 843(b)(3). With Congress' full knowledge of this, and rejection of the strike with pay provision, it is difficult to conclude that congressional silence on the benefits issue connotes implicit authorization of the financial and seniority benefits provided in the MRP system.

the OSH Act allowing an employee "to choose not to perform his assigned task because of a reasonable apprehension of death or serious injury coupled with a reasonable belief that no less drastic alternative is available." *Id.* at 4190; 29 C.F.R. § 1977.12, 38 Fed. Reg. 2681, 2683 (1973), as corrected 38 Fed. Reg. 4577 (1973). The Supreme Court upheld the regulation as being consistent with the OSH Act. However, it did so because the employer was *not required to pay the employee* who walked off the job.

The pertinent discussion in *Whirlpool* addresses the Daniels bill which had attempted to introduce the strike with pay provision into the OSH Act. The Court gives a detailed analysis of the congressional intent on the subject, and concludes that Congress was not addressing the *Whirlpool* situation.

> Congress rejected a provision that did not concern itself at all with conditions posing real and immediate threats of severe injury. The remedy which the rejected provision furnished employees could have been invoked only after 60 days had passed following HEW's inspection and notification that improperly high levels of toxic substances were present in the workplace. Had that inspection revealed employment conditions posing a threat of imminent and grave harm, the Secretary of Labor would presumably have requested, long before the expiration of the 60-day period, a court injunction pursuant to other provisions of the Daniels bill. Consequently, in rejecting the Daniels bill's "strike with pay" provision, Congress was not rejecting a legislative provision dealing with the highly perilous and fast-moving situations covered by the regulation now before us.
>
> It is also important to emphasize that what primarily troubled Congress about the Daniels bill's "strike with pay" provision was its requirement that employees be paid their regular salary after having

> properly invoked their right to refuse to work under the section. It is instructive that virtually every time the issue of an employee's right to absent himself from hazardous work was discussed in the legislative debates, it was in the context of the employee's right to continue to receive his usual compensation.
>
> *When it rejected the "strike with pay" concept, therefore, Congress very clearly meant to reject a law unconditionally imposing upon employers an obligation to continue to pay their employees their regular pay checks when they absented themselves from work for reasons of safety.*

Id. at 4193-94 (emphasis added; footnotes omitted). The Supreme Court concluded that the regulation under review did not require this pay, and only required that the employer not discriminate against the employees who walked off the job. It thus did not fall within the legislative history surrounding the Daniels bill.

It is difficult to imagine how the Supreme Court could have spoken more clearly to the instant situation. The majority attempts to distinguish the two situations because under the Daniels bill the employee could initiate his own removal whereas under the lead standard the removal may be imposed on both the employer and the employee against their will. However, the Supreme Court was clearly stressing the congressional disapproval of forcing employers to continue compensating employees removed for safety reasons. This concern would hold true regardless of the outside force that brought it about. In addition, like the situation in the Daniels bill and unlike the *Whirlpool* scenario, the regulation in the instant case also does not concern "imminent dangers" or risk of harm. Therefore, because of the credence given the legislative history surrounding the Daniels bill by the Supreme Court, it is submitted that the majority in the instant case misapplied the legislative history and misread *Whirlpool*. *Whirlpool* alone justifies this dissent.

However, to culminate the review of congressional intent which is adverse to the MRP, 29 U.S.C. § 653(b)(4) must be read. This section of the OSH Act precludes the promulgation of such a far reaching MRP as OSHA seeks to establish for the lead industries. Section 653(b)(4) proscribes anything in the OSH Act from "*supersed[ing] or in any manner affect[ing] any workmen's compensation law. . .*" *Id.* (Emphasis added). Since an employee may be removed before he is overtly ill or incapable of performing his job under the lead standard, he receives *greater protection* under it than under any state workmen's compensation law in existence. In addition, even though he may be disabled because of lead poisoning, he will be removed under the authority of new regulations with *full compensation.* Since most workmen's compensation statutes require a diminution of wages before they become effective, there is no way that lead will ever again be the cause of disabling conditions warranting the receipt of workmen's compensation. Finally, most workmen's compensation laws only provide benefits which amount to a portion of the employee's wages, whereas the lead industries regulation, at its maximum, mandates full seniority and the payment of full wages for eighteen months. For these reasons, the medical removal protection system in the lead standard clearly affect and supersede workmen's compensation laws in violation of § 653(b)(4).[7]

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[7] The majority and OSHA maintain that *all* OSHA safety standards affect workmen's compensation laws in some respects; by making the work place safer, fewer employees will require workmen's compensation. This argument is a *reductio absurdum* which is clearly unwarranted. There is a great difference between ensuring a safe work place, which is a goal written into the OSH Act, *see* 29 U.S.C. § 651(b)(5), and providing full financial benefits to removed employees. The latter is in direct contradiction to 29 U.S.C. § 653(b)(4), and was specifically forbidden by Congress in the relevant statute upon which OSHA relies.

For the foregoing reasons, it is apparent that OSHA exceeded its authority by promulgating the MRP with its attendant financial benefits in excess of the workmen's compensation laws, and in its present form the MRP program should be stricken from the regulations.

V. The Feasibility Standard and Burden of Proof

The majority attempts to assemble the legal mechanism for grappling with a very inartfully crafted provision in the OSH Act, 29 U.S.C. § 655(b)(5) (1976).[8] The task evokes my sympathy but I disagree with two aspects of their end conclusion because they fly in the face of the Supreme Court's recent ruling in the Benzene Case, *Industrial Union Department, AFL-CIO v. American Petroleum Institute*, —— U.S. ——, 48 U.S.L.W. 5022 (July 2, 1980).

First, in order to construct a working model for the public, agencies, and courts, the majority reads into § 655(b)(5) a system of "presumptions" which are not provided by Congress. This gratuitous legislation is characterized as "resolving the circularity" problem. See Majority Opinion at 153.

> The feasibility test for a standard that only expects feasible improvements from employers may ap-

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[8] This section provides in part:

> (5) The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life.

29 U.S.C. § 655(b)(5) (1976).

> pear circular. But reasonable construction of such a standard avoids circularity. The cases have apparently treated these standards as creating a general *presumption* of feasibility for an industry. A company could not simply refuse to pursue engineering or work practice controls by asserting their infeasibility. Rather, it would have to attempt to install controls to the limits of contemporary technical knowledge and of its own financial resources. Judicial review of feasibility would have some meaning, because the court would have to find substantial evidence to justify this presumption—evidence that the technical knowledge to meet the PEL without relying on respirators was available or would likely be available when deadlines arrived, and that enough firms could afford to so meet the PEL that the market structure of the industry would survive.

Majority Opinion at 153-54 (emphasis in original). In any later judicial review of temporary variance petitions or enforcement proceedings under 29 U.S.C. § 659 (1976), the employer would bear the burden of proving infeasibility for his industry specifically, or the industry generally. *Id.* at 154.

This system must be questioned because it does not correlate with the Supreme Court's discussion in *American Petroleum Institute.* The Supreme Court likewise devised a system of presumptions for "proving the significance of the risk . . . where scientific knowledge is imperfect and the precise quantification of risks is therefore impossible." 48 U.S.L.W. at 5034. This imperfect knowledge problem compares to OSHA's problem of proving technological feasibility where the technology does not presently exist, and the agency is authorized to promulgate standards that are technology forcing.

The following was OSHA's interpretation of its burden of proving "significant risk" from industrial exposure to benzene prior to *American Petroleum Institute*:

> The Agency's position is that there is substantial evidence in the record to support its conclusion that there is no absolutely safe level for a carcinogen and that, therefore, the burden is properly on industry to prove, apparently beyond a shadow of a doubt, that there *is* a safe level for benzene exposure. The Agency argues that, because of the uncertainties in this area, any other approach would render it helpless, forcing it to wait for the leukemia deaths that it believes are likely to occur before taking any regulatory action.

Id. at 5034 (emphasis in original; footnotes omitted). Thus, OSHA believed it could shift the burden of proof to the industries after it has met its initial burden. Likewise, OSHA believes it need only provide substantial evidence that some vague technological ideas or concepts exist now for engineering controls that may appear in the future to aid the industries to comply with the PEL without the use of respirators. From that point on, and for the primary smelters this may last up to ten years, the industries bear the burden to prove infeasibility.

However, the Supreme Court did not accept OSHA's system concerning proof of significant risk.

> As we read the statute, the burden was on the Agency to show, on the basis of substantial evidence, *that it is at least more likely than not* that long-term exposure to 10 ppm of benzene presents a significant risk of material health impairment. Ordinarily, it is the proponent of a rule or order who has the burden of proof in administrative proceedings. See 5 U.S.C. § 556(d). In some cases involving toxic substances, Congress has shifted the burden of proving that a particular substance is safe onto the party opposing the proposed rule. The fact that Congress did not follow this course in enacting OSHA indicates that it intended the Agency to bear the

> normal burden of establishing the need for a proposed standard.

Id. at 5034 (emphasis added; footnotes omitted). The most OSHA could arrive at was that the lowered benzene PEL was "likely" to have "appreciable" benefits. This was insufficient.

The Benzene and Lead cases are very comparable. Proof of scientific certainty as to the risks of benzene exposure was difficult to compile. But the Supreme Court would not allow the agency to pass this burdensome standard onto the industries unless it was proven "at least more likely than not" that long-term exposure to 10 ppm of benzene presents a significant risk of material health impairment. Similarly, it is difficult to show that all the necessary technology exists or will exist for the lead industries to comply with the stringent 50 ug/m^3 PEL by engineering or work controls without the use of respirators. This is obvious from the fact that little evidence of working models for innovative controls presently exists, and OSHA was forced to provide for lengthy phase-in periods for the industries to devise the technology. OSHA all the while recognized that it may *never* be developed. Yet, before such a burden is passed to the industries, I believe the Supreme Court teaches that OSHA must prove, by substantial evidence, that it is "more likely than not" that the standard is feasible, and the technology will more likely than not exist to enable the industries to comply. Using the Supreme Court's reasoning, this is the *least* that OSHA, as proponent of the rule, should have to prove on judicial review before any presumption of feasibility may be said to exist.

"Likely" and "more likely than not" are dissimilar standards. The latter is a far more stringent burden of proof. Since the majority only applied the "likely" standard in evaluating whether the necessary technology

would "likely be available when deadlines arrived", I dissent. On the issue of feasibility, with respect to industries where the technology to achieve compliance does not presently exist, I would remand the case to the agency for further proof in accordance with the appropriate standard and burden of proof.

A second aspect of the majority opinion's feasibility discussion that prompts my concern appears on page 159. This discussion involves the presumption issue as applied to those industries where OSHA concedes that respirators will be necessary in some of the operations in order to comply with the 50 ug/m^3 PEL.

> Insufficient proof of technological feasibility for a few isolated operations within an industry, or even OSHA's concession that respirators will be necessary in a few such operations, will not undermine this general presumption in favor of reasibility. . . . In any proceeding to obtain relief from an impractical standard for such operations, however, the insufficient proof or conceded lack of proof will *reduce* the strength of the presumption a firm will have to overcome in justifying its use of respirators.

Majority Opinion at 159 (emphasis in original). The idea of a "reduction" in the presumption is absurd. If OSHA concedes that respirators will be essential to meet the PEL, and that engineering controls are infeasible for those specific operations, then OSHA never met its initial burden of proving by substantial evidence that it was "likely" the technology would exist to comply (if we were to apply the majority's standard of proof), much less that it was "more likely than not" that the technology would be available. The latter standard, as I have already explained, is the appropriate one for this court to apply. Therefore, because of OSHA's own concession and lack of proof, *no presumption ever came into existence*, and the industry should not have any burden of

rebutting a presumption of feasibility for those specific operations. To hold otherwise is to force onto the industry an unjustified and unnecessary burden that statutorily belongs to the agency.

The gist of this section, and the Supreme Court's opinion in *American Petroleum Institute*, is that agency has a responsibility to prove the necessity for, and feasibility of the regulations it promulgates. The OSH Act, although difficult to interpret in part, makes this clear. If industries are to survive in these troubled times, OSHA must at least be sure of what it is requiring of the industries, before forcing them to invest millions of dollars in projects that may prove to be infeasible and meaningless.

VI. Feasibility of the Lead Standard

Beyond the problems of the majority's construction of the feasibility requirement, many of the agency's methods in determining feasibility are also questionable. Rather than discuss each separate industry, the general difficulties in methodology will be explained. Because these problems are of serious magnitude, and pervade the entire rulemaking, the whole case should be remanded to the agency.

A. *"Best Available Evidence" Requirement*

The OSH Act, 29 U.S.C. § 655(b)(5) (1976) requires that the standards promulgated by the agency be based upon the "best available evidence."[9] It is conceded by OSHA and the majority that very little record evidence exists for the technological feasibility of the 50 ug/m³ air-lead level, and *no evidence exists to support the economic feasibility of that level.* OSHA never even in-

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[9] See note 8, *supra.*

troduced its own witnesses to testify on these issues, instead it concentrated on the feasibility of the proposed 100 ug/m³ level. Yet, the majority reasons that the final lead standard at 50 ug/m³ is based on substantial evidence, and the best *available* evidence.

The essence of their reasoning is enunciated in footnote 133 of the Majority Opinion at pages 170-71.

> 133. LIA argues that the statutory requirement that OSHA act on the "best available evidence," 29 U.S.C. § 655(b)(5) (1976), means that OSHA had to direct the rulemaking to the 50 ug/m³ standard. But the "best available evidence" rule, as construed by our cotton dust decision, requires OSHA to act immediately to protect workers as best it can, without waiting for scientific certainty. *Industrial Union Dept, AFL-CIO v. American Petroleum Institute, supra* note 54, 48 U.S. L. Week of 5035 (plurality opinion); *AFL-CIO v. Marshall, supra* note 54, —— F.2d at ——, slip op. at 25. We decline to read this phrase as setting an unprecedented evidentiary burden on the agency—to show not only that its evidence was substantial, but also that its evidence was the best it could possibly have presented.

The inadequacy of the record evidence to sustain OSHA's statutory burden is apparent from a mere reading of the footnote. The majority permits the agency to utilize as supporting evidence of feasibility the evidence introduced to support the proposed PEL at 100 ug/m³ that is far different from the one actually promulgated at 50 ug/m³.

This conclusion summarizes one of the most serious problems throughout this rulemaking—OSHA actually fails to perceive a difference between the 100 ug/m³ and the 50 ug/m³ levels. Instead, it rests its decision on the vague and unsupportable concept that the same evidence of economic and technological feasibility that might support the 100 level is also adequate, without more, to support the 50 level. Thus, no additional evidence whatsoever need be gathered for the latter. Yet, its reliance

for this conclusion of transferrability is not based on one shred of evidence within the record. Therefore, if normal judicial standards were applied the court would hold that it was impossible to support the feasibility of the 50 ug/m³ standard.

Moreover, the conclusion in the footnote is patently irresponsible. *OSHA* bears the initial burden of proving feasibility based on the best available evidence, and substantial evidence must be introduced to support the finding. To hold as does the majority, that OSHA is relieved of the responsibility of compiling even the most fundamental data to support its regulations is ludicrous. The lead standard need not be promulgated with such speed that its evidentiary support may consist of thin-air. By requiring some substantial evidence, the court need not require that exact certainty be evidenced for each provision. The only way that OSHA's final standard may be upheld is to prove that OSHA made a bona fide *attempt* to gather the best *available* evidence. The word "available" connotes a responsibility on the part of the agency to gather the necessary and appropriate data. OSHA cannot cursorily gather what may scantily exist on a subject, promulgate a standard for compliance, and pronounce that it is based on the "best *available* evidence." That is in substance the state of the public record in this case. OSHA has not introduced evidence as to the feasibility of a 50 ug/m³ PEL, and its neglect to introduce any evidence in support of a standard at that level cannot serve as a substitute for the necessary substantial evidence.

Finally, approval of OSHA's failure to fulfill its statutory responsibility is also evidenced by the majority's attempt to rationalize the difficulty in arriving at the cost to the industry for meeting the 100 ug/m³ level. Majority Opinion at 170. The majority notes that the technology OSHA evaluated is speculative, and the cost

figures are difficult to gather from the industry. Thus, "attempting to extend the highly speculative 'guesstimates' on the costs of the 100 ug/m^3 standard to account for the incremental costs of the lower standard [at 50 ug/m^3] would produce very diminishing analytic returns." *Id.* The Act, however, mandates that the agency make the attempt, and the majority is indulging in *post hoc* rationalizations.

Further, the majority concludes that since the consultants evaluating the economic feasibility of the 100 ug/m^3 proposed level indulged in double-counting,[10] and failed to calculate into their data the ability of an industry to pass through or absorb costs, "there is nothing inherently invalid about OSHA projecting its determination of the feasibility of a 100 ug/m^3 PEL to a well phased-in 50 ug/m^3 PEL." *Id.* However, one has nothing to do with the other. This conclusion in the majority opinion would seem to indicate that if the same consultants performed an evaluation of costs for a 100 ug/m^3 *and* 50 ug/m^3 PEL, both with the same alleged problems of double-counting and failure to pass through the costs, and then these two alleged erroneous calculations were factored out, the cost for the 100 or 50 level would essentially be the same. Absolutely no evidence in the record exists to support this conclusion. Therefore, OSHA should not be permitted to slough off its statutory responsibility to produce the best available evidence by criticizing its own consultants' techniques.

Because OSHA failed to support its findings of feasibility by any evidence in the public record in support of the 50 ug/m^3 PEL, I must dissent from the conclusion of the majority to affirm OSHA's finding in this respect.

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[10] See part VI C, *infra*.

B. *Technological Feasibility*

Without delving into the specifics for each industry, it is essential to express my doubt as to one more aspect of the majority's overall methodology regarding technological feasibility. The majority opinion places great reliance upon the findings of Dr. Melvin First of the Howard School of Public Health. OSHA summarized his principles in the Preamble to the Final Standard at 43 Fed. Reg. 54476-78. In essence, Dr. First contends that all operations in an industry may be "controlled" by separating workers "from contact with lead dust or fume by erecting physical barriers between the worker and the contaminant or by the use of exhaust ventilation that creates air currents to sweep airborne dust and fumes away from the breathing zone of workers and draws them out of the workroom." *Id.* at 54477. He boldly alleges that this may be accomplished with *every* operation that is mechanized and automated. *Id.*; Exhibit 270.

I do not challenge his basic proposal. However, OSHA and the majority seem broadly to accept this First principle, without an individualized analysis, that almost every operation in almost every industry can be fully contained.

This theory is applied as a rationale in support of technological feasibility throughout OSHA's Preamble. More detail should have been added to the Preamble explaining, *for each affected industry*, how this First principle can practically be applied. Only in that way will the agency have fulfilled its responsibility explained in the Cotton Dust case.

> To facilitate this review of the record, the agency must pinpoint the factual evidence and the policy considerations upon which it relied. This requires explication of the assumptions underlying predictions

> or extrapolations, and of the basis for its resolution of conflicts and ambiguities. In enforcing these requirements, the court does not reach out to resolve controversies over technical data. Instead, it seeks to ensure public accountability. Explicit explanation for the basis of the agency's decision not only facilitates proper judicial review but also provides the opportunity for effective peer review, legislative oversight, and public education. This requirement is in the best interest of everyone, including the decisionmakers themselves.

AFL-CIO v. Marshall, 617 F.2d 636, 651-52 (D.C. Cir. 1979) (footnotes omitted).

Only by a more "explicit explanation" of how the First principle applies to each industry will OSHA have fulfilled its responsibility. The case also should be remanded to the agency on this basis.

C. *Economic Feasibility*

Little more needs to be said about the lack of evidence concerning the economic feasibility of attaining the 50 ug/m^3 PEL. All parties and the majority concede that no evidence was introduced on the subject. Since also no rational evidence was introduced on how OSHA had fulfilled its responsibility by utilizing the evidence introduced for the 100 ug/m^3 level, this case should be remanded.

In addition, the conclusion of OSHA that *its consultants* improperly double-counted in arriving at their ultimate cost estimates is subject to substantial question. In particular, OSHA concluded that its own expert, DBA, had "includ[ed] in the cost of the new lead standard the costs that intransigent firms have yet to expend in meeting the old and more generous PEL of 200 ug/m^3". Majority Opinion at 167; 54494/3-54495/1. DBA ex-

plained that segregating these costs would be impossible.[11] OSHA, however, disputed the inclusion of the costs necessary to reach the 200 ug/m³ level. Therefore, the agency concluded that DBA's estimates were "considerably overestimated."

OSHA's conclusion is far too simplistic. For an industry to reach the 200 ug/m³ level, as previously re-

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[11] DBA explained that:

> Ideally, the costs of complying with the new requirements of the standard should be isolated from the requirements already promulgated, but not presently being complied with. For the industries studied, all of the cost estimates associated with compliance, except engineering costs, are estimates of the incremental costs of compliance. Unfortunately, it is not possible to accurately establish the incremental costs associated with engineering controls. The main reasons for this shortcoming are as follows:
>
> (1) The State-of-the-Art of the effectiveness of engineering controls is not developed to the degree necessary to make such judgments. It is thought that the same basic approaches may be used to control exposures to either 200 or 100 ug/m³.
>
> (2) Engineering controls are often built to standard specifications which are not designed to provide a specific control efficiency, but rather the optimum control possible for the particular system.
>
> (3) Exposure levels characterizations of the workplace are not sufficiently complete to provide data necessary (a) to establish complete contributory emissions, or (b) to establish accurately the levels of reduction necessary to meet a 200 ug/m³ level and a 100 ug/m³ level.
>
> (4) The conditions of exposure, and hence the needs for control, vary widely from operation to operation, plant to plant, day to day, hour to hour, and even from employee to employee at the same operation. (Ex. 26, p. 4-10 - 4-11.)

43 Fed. Reg. 54494/3.

quired, it may only have needed respirators, or simple engineering controls at a minimal cost. However, for that industry, to reach 100 ug/m³ or 50 ug/m³ from *either* the 200 ug/m³ level, or a higher exposure level, it may be necessary to completely rebuild its plant at an outrageous cost. OSHA fails to give consideration to such possibilities. Furthermore, what the agency *should* have been concerned with is the ultimate cost and burden or effect on the industry, despite the initial starting point for calculating the cost. It is agreed by all that an OSHA standard is infeasible if it causes massive dislocation to the industry, or imperils its existence. *AFL-CIO v. Brennan*, 530 F.2d 109, 123 (3d Cir. 1971); *American Iron & Steel Institute v. OSHA*, 577 F.2d 825, 836 (3d Cir. 1978). Should this be any less true just because substantial segments of the industry might not have complied with the 200 ug/m³ standard? Such ruling is open to serious doubt.

But more importantly, OSHA failed to explain why these costs should not be considered, or *how* they could be separately extracted, and what the end figure would be once they were extracted. It is insufficient to merely criticize one's own experts, without setting forth proper conclusions and reasons why.[12] As noted in the Cotton Dust case:

> If the constraint of economic feasibility is to have any effect on the agency's rulemaking, it demands

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[12] For instance, OSHA "explained" how it reduced the double-counting figures for primary smelters. All it did was list the kinds of double-counting it perceived, and stated:

> Given the above, reducing the total capital cost estimate for the 100 ug/m³ interim level by one-third for all forms of double-counting is reasonable.

43 Fed. Reg. 54498/1. Why is this reasonable? Where did the figure "one-third" come from? These questions remain unanswered and hence the agency's computation is not supported and cannot be approved.

> more serious consideration than was given here. The agency is allowed to rely on the best available evidence, but here it *simply* gives general criticisms of the cottonseed industry's cost estimates. It failed to offer an alternative estimate of the standard's impact on this industry. As a result, the agency's position is too unclear to permit us to complete our reviewing function.

AFL-CIO v. Marshall, 617 F.2d 636, 672-73 (D.C. Cir. 1979) (footnotes omitted). This court remanded the economic feasibility issue for the cottonseed industry to OSHA for clarification and reconsideration because of the defect in OSHA's procedures indicated by the above criticism. *Id.* at 673. The same result should be ordered here for every industry in which OSHA contends there was "double-counting." [13]

D. *Cost-Benefit Analysis*

Throughout this rulemaking OSHA has claimed that it need not perform a cost-benefit analysis. The Majority Opinion, relying on the Cotton Dust case, *AFL-CIO v. Marshall, supra*, concurs and fails to even evalu-

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[13] OSHA's blind eye toward cost impacts may be evidenced in its cavalier attempt to compare the primary smelters' ability to pass through the costs of 1¢ per pound of lead produced. See Majority Opinion at 180. The agency, by characterizing the cost at such a small fraction, treats this almost as a triviality. In fact when 1¢ per pound is multiplied by the total number of pounds of lead produced annually, it is a very substantial sum. For example, OSHA concluded that the amount of lead produced by the primary smelters in 1975 was 723,879 short tons, 42 Fed. Reg. 54498/2, 54509/1. This amounts to 1,447,758,000 *pounds* of lead. At one cent per pound, the total cost to the primary smelters is $14,477,580.00. Fourteen million dollars per year is *not* a trivial amount to pass through to the customers. Reducing costs so that they deceptively appear trivial is an approach that a government should be loathe to take with its citizens.

ate the agency's conclusion. However, since the issue is still very much undecided by the Supreme Court after *American Petroleum Institute, supra* it deserves some comment here.

The complex legal analyses for and against the statutory necessity of a cost-benefit analysis have been discussed at length by various courts. *Compare AFL-CIO v. Marshall, supra with American Petroleum Institute v. OSHA*, 581 F.2d 493 (5th Cir. 1978). The Supreme Court recently affirmed *American Petroleum Institute*, but explicitly determined not to decide the necessity of performing a cost-benefit analysis.[14] Yet, from the plurality opinion of Justice Stevens, it is difficult to conclude that a cost-benefit analysis is *not* necessary.[15] He maintained that "it seems manifest that Congress intended, at a bare minimum, that the Secretary find a significant risk of harm and therefore a probability of significant benefits before establishing a new standard." 48 U.S.L.W. at 5032. When this is coupled with the necessity of proving economic feasibility under 29 U.S.C. § 655(6)(b)(5), a definite form of cost-benefit analysis is mandated.

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[14] The Supreme Court stated that OSHA must determine as a threshold matter that the "toxic substance in question poses a significant health risk in the workplace and that a new, lower standard is therefore 'reasonably necessary or appropriate to provide safe or healthful employment and places of employment.'" 48 U.S.L.W. at 5024. Because OSHA had failed to do that in *American Petroleum Institute*, the Court found it was "unnecessary" to determine whether the Fifth Circuit was correct in reading into the statute a cost-benefit analysis requirement.

[15] Mr. Justice Powell concurred separately with the plurality opinion, and stated that a cost-benefit analysis is essential. See 48 U.S.L.W. 5037 (Powell, J. concurring).

To the extent that this bare minimum has not been performed in the instant case, it should be remanded to the agency for reconsideration.

The majority opinion does not make any meaningful reply whatsoever to the above points but asserts generally that in view of *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519 (1978) the court should be "wary of imposing on the agency any procedural or evidentiary constraints beyond those expressly established by Congress." Majority Opinion at 7 n.6. In my judgment the majority places on *Vermont Yankee* weight it was never meant to hold, and ignores several constraints expressly established by Congress. Under the Occupational Safety and Health Act whenever "a public hearing on . . . objections" is requested OSHA is required to specify "the occupational safety or health standard to which objection has been filed and a hearing requested and [to specify] a time and place for such hearing." 29 U.S.C. § 655(b)(3). Then, if the standards deal with toxic materials or harmful physical agents, the Secretary "shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life." In addition, among other bases he "shall [consider] . . . the latest available scientific data in the field, the feasibility of the standards, and experience gained under this and other health and safety laws." 29 U.S.C. § 655(b)(5). And, if the "rule promulgated by the Secretary differs substantially from an existing natural consensus standard, the Secretary shall, at the same time, publish in the Federal Register a statement of the reasons why the rule as adopted will better effectuate the purposes of this act than the national consensus standard." § 655(b)(8). Further, "whenever the

Secretary promulgates any standard, makes any rule . . . under this [act] he shall include a statement of the reasons for such action, which shall be published in the Federal Register." § 655(e). And other statutory requirements are set forth above. Finally, on "judicial review" of such standard "the determinations of the Secretary shall be conclusive [only] *if supported by substantial evidence in the record considered as a whole.*" § 655(f) (emphasis added).

These are exacting evidentiary requirements, as the Supreme Court indicated in the Benzene Case, *Industrial Union Dep't, AFL-CIO v. American Petroleum Institute*, —— U.S. ——, 48 U.S.L.W. 5022 (July 2, 1980), and wipe out the wide discretion which is permitted in informal rulemaking. By failing to give effect to these requirements, the majority have improperly enlarged the discretion which OSHA possesses in this rulemaking proceeding. Actually the discretion which the majority opinion applies to the Rules is more consistent with that permissible under informal rule making than the requirement of the statute for "substantial evidence," *supra.* From the foregoing it is apparent that this dissent is consistent with *Vermont Yankee*: it does not require procedures beyond those required by the applicable statute. 435 U.S. at 525. Every complaint here has a sound basis in the OSH Act. We cannot term as "evidence" that which has not been made a part of the public record (I. Improper Use of Consultants); the notice that OSHA contemplated a 100 ug/m^3 PEL was statutorily insufficient since the rule promulgated at 50 ug/m^3 was not a natural outgrowth of the notice or the resultant hearing (II. The Notice of Rulemaking); the Short Report cannot be considered as statutory "evidence" because since its author was not identified no proper foundation was laid for its consideration as part of the statutory "record" (III. The Short Report); the financial benefits

of the medical removal protection system clearly violate the statutory prohibition against "supersed[ing] . . . any workmen's compensation law" (IV. Medical Removal Protection); and the failure to demonstrate technological and economic "feasibility" in accordance with the statutory standard, and the shifting of the burden of proof on that issue in violation of the Benzene Case, are clear violations of other specific statutory requirements of the OSH Act (V. The Feasibility Standard and Burden of Proof, IV. Feasibility of the Lead Standard).

Holding the agency to the requirement of "substantial evidence in the record considered as a whole" is *not* an "improper[] intru[sion] into the agency's decisionmaking process." *Id.*, 525. In fact the remand which the majority orders, and in which I concur, corroborates the findings of numerous deficiencies in the agency's rulemaking. In addition the specific deficiencies pointed out above are corroborated by the failure of the majority to discuss or answer them. *Cf.* Majority Opinion at 7 n.6.

CONCLUSION

For the foregoing reasons I respectfully dissent and would remand the case for the agency to finish the task assigned to it by the statute.

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 79-1048 **September Term, 19** 80

United Steelworkers of America, AFL-CIO-CLC,
Petitioner

v.

F. Ray Marshall, Secretary of Labor, United States Department of Labor, and Doctor Eula Bingham, Assistant Secretary for Occupational Safety and Health, United States Department of Labor, Respondents

Cast Metals Federation, International Union, United Automobile, Aerospace and Agricultural Implement Workers of America, United Steelworkers of America, AFL-CIO-CLC et al., Shipbuilders Council of America, Oil, Chemical and Atomic Workers International Union, AFL-CIO, Dixie Metals Company, National Constructors Association, General Motors Corporation, Bunker Hill Company, Standard Industries, and Schuykill Metals Corporation, Intervenors

United States Court of Appeals
for the District of Columbia Circuit

FILED NOV 20 1980

GEORGE A. FISHER
CLERK

Before: MacKINNON, Circuit Judge

O R D E R

It is ORDERED by the Court, sua sponte, that the dissenting opinion filed by Circuit Judge MacKINNON in the above entitled case on August 15, 1980 be, and it hereby is, amended as follows:

Page 13, lines 24-25, "demands" should read "remands"

Page 19, line 26, "affect" should read "affects" and "supersede" should read "supersedes"

Page 20, line 18, "are" should read "is"

Page 24, line 17, "reasibility" should read "feasibility"

Page 25, line 6, "is that agency" should read "is that the agency"

Page 29, line 7, "Howard" should read "Harvard"

Per Curiam
For the Court
George A. Fisher
Clerk

Statutory Addendum

The Occupational Safety and Health Act of 1970 (29 U.S.C. §§ 651 & ff):

Section 2(b)(1) and (2): The Congress declares it to be its purpose and policy, through the exercise of its powers to regulate commerce among the several States and with foreign nations and to provide for the general welfare, to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources—(1) by encouraging employers and employees in their efforts to reduce the number of occupational safety and health hazards at their places of employment, and to stimulate employers and employees to institute new and to perfect existing programs for providing safe and healthful working conditions . . . [and] (2) by providing that employers and employees have separate but dependent responsibilities and rights with respect to achieving safe and healthful working conditions . . . .

Section 3: For the purposes of this Act— . . .

(8) The term "occupational safety and health standard" means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment.

Section 4(b)(4): Nothing in this Act shall be construed to supersede or in any manner affect any workmen's compensation law or to enlarge or diminish or affect in any other manner the common law or statutory rights, duties, or liabilities of employers and employees under any law with respect to injuries, diseases, or death of employees arising out of, or in the course of, employment.

Section 6(b)(5): The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. Development of standards under this subsection shall be based upon research, demonstrations, experiments, and such other information as may be appropriate. In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, the feasibility of the standards, and experience gained under this and other health and safety laws. Whenever practicable, the standard promulgated shall be expressed in terms of objective criteria and of the performance desired.

Section 6(b)(7): Any standard promulgated under this subsection shall prescribe the use of labels or other appropriate forms of warning as are necessary to insure that employees are apprised of all hazards to which they are exposed, relevant symptoms and appropriate emergency treatment, and proper conditions and precautions of safe use or exposure. Where appropriate, such standard shall also prescribe suitable protective equipment and control or technological procedures to be used in connection with such hazards and shall provide for monitoring or measuring employee exposure at such locations and intervals, and in such manner as may be necessary for the protection of employees. In addition, where appropriate, any such standard shall

prescribe the type and frequency of medical examinations or other tests which shall be made available, by the employer or at his cost, to employees exposed to such hazards in order to most effectively determine whether the health of such employees is adversely affected by such exposure. In the event such medical examinations are in the nature of research, as determined by the Secretary of Health, Education, and Welfare, such examinations may be furnished at the expense of the Secretary of Health, Education, and Welfare. The results of such examinations or tests shall be furnished only to the Secretary or the Secretary of Health, Education, and Welfare, and, at the request of the employee, to his physician. The Secretary, in consultation with the Secretary of Health, Education, and Welfare, may by rule promulgated pursuant to section 553 of title 5, United States Code, make appropriate modifications in the foregoing requirements relating to the use of labels or other forms of warning, monitoring or measuring, and medical examinations, as may be warranted by experience, information, or medical or technological developments acquired subsequent to the promulgation of the relevant standard.

Section 6(f): Any person who may be adversely affected by a standard issued under this section may at any time prior to the sixtieth day after such standard is promulgated file a petition challenging the validity of such standard with the United States court of appeals for the circuit wherein such person resides or has his principal place of business, for a judicial review of such standard. A copy of the petition shall be forthwith transmitted by the clerk of the court to the Secretary. The filing of such petition shall not, unless otherwise ordered by the court, operate as a stay of the standard. The determina-

tions of the Secretary shall be conclusive if supported by substantial evidence in the record considered as a whole.

Section 27(a): (1) The Congress hereby finds and declares that—

(A) the vast majority of American workers, and their families, are dependent on workmen's compensation for their basic economic security in the event such workers suffer disabling injury or death in the course of their employment; and that the full protection of American workers from job-related injury or death requires an adequate, prompt, and equitable system of workmen's compensation as well as an effective program of occupational health and safety regulation; and

(B) in recent years serious questions have been raised concerning the fairness and adequacy of present workmen's compensation laws in the light of the growth of the economy, the changing nature of the labor force, increases in medical knowledge, changes in the hazards associated with various types of employment, new technology creating new risks to health and safety, and increases in the general level of wages and the cost of living.

(2) The purpose of this section is to authorize an effective study and objective evaluation of State workmen's compensation laws in order to determine if such laws provide an adequate, prompt, and equitable system of compensation for injury or death arising out of or in the course of employment.